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Medicare Participating Heart Bypass Center Demonstration

Volume II

Final Report

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8 Patient Severity and Mortality in Demonstration and Competitor Hospitals

8.1 Introduction

The HCFA Participating Heart Bypass Center Demonstration was undertaken to evaluate the effect of bundled payments on the quality and outcome of care. The two primary outcome variables evaluated in Chapter 7 are in-hospital and one-year post discharge mortality. Additional analyses were conducted to evaluate changes in length of stay, post-operative complications, and readmission rates. The overall finding was that in-hospital and one-year mortality rates declined during the course of the demonstration and as a function of the length of time the hospital participated in the demonstration, after controlling for changes in case mix.

Our analyses, however, did not allow us to answer the question, would the trend in mortality have occurred absent the demonstration? It is important to remember that the results presented in this report are not generated from a randomized clinical trial. The demonstration hospitals have unique control over the patients who undergo heart bypass surgery. In addition, we did not collect detailed clinical information on patients discharged prior to the start of the demonstration that could serve as a historical control group. Nor did we collect detailed clinical information from competitor hospitals. Rather, we relied upon multivariate statistical methods for assessing time trends while adjusting for differences in patient severity across hospitals over time. Even with multivariate methods, however,

patients discharged early on in the demonstration become the *de facto* intertemporal control group.

In this chapter, we address more directly the issue of what effect the demonstration may have had on patient outcomes by comparing quality and outcome measures in demonstration hospitals versus hospitals located in each of the study demonstration site's market area. To do so, it is necessary to identify a common source of information. Unfortunately, medical abstract data in control hospitals were not available. Medicare claims data appear to be a reasonable substitute for such information.

Increasingly, federal, state, and private health care policy makers and researchers are turning to claims to evaluate the quality of care delivered to their beneficiaries because claims data bases provide considerable flexibility in modeling the process and outcome of care, are typically very cost-effective, and do not require the intrusion of data abstractors into provider settings (Garnick *et al*, 1994; Weiner *et al*, 1995). On the other hand, claims data often lack the clinical specificity necessary to define the severity of a disease or complication, nor do they contain results of diagnostic tests or therapeutic interventions. Thus, for many appropriateness/quality outcome studies it is necessary to link clinical information obtained from chart abstraction, patient surveys, etc. with claims data to obtain a complete picture of the patient's clinical condition, course of treatment, and final outcome status.

Because we do not have any direct clinical information from competitor hospitals, it is necessary to specify a patient severity/outcome model that can be estimated exclusively

from claims data. A prime candidate for this study is a model developed by the Northern New England Cardiovascular Disease Study Group (NNECDSG), a voluntary research consortium of all hospitals in Maine, New Hampshire, and Vermont that perform CABG surgery. The primary interest in the NNECDSG is to foster voluntary continuous improvement in the process and outcome of care for CABG patients. To assist the clinicians and administrators in this effort, the NNECDSG has developed a parsimonious hospital mortality model that allows for an examination of hospital-level performance relative to predicted performance while controlling for differences in casemix (O'Connor, 1996; O'Connor, 1991).

The NNECDSG model is a mixture of ten demographic and clinical data elements: age, sex, body surface area (BSA), ejection fraction, history of previous CABG, revascularization priority (urgent or emergent), number of diseased vessels, degree of left main artery stenosis, left ventricular end diastolic pressure, and the Charlson Index as a summary measure of patient co-morbidity. In multivariate analyses of CABG outcome data, the NNECDSG found that all but number of diseased vessels and severe stenosis of the left main coronary artery are strong predictors of in-hospital mortality.

Claims data are an excellent source for some of the information contained in the NNECDSG model, (e.g., sex, age, previous cardiac bypass, and revascularization priority). To a lesser degree, claims data can provide information needed for the construction of the Charlson Index (D'Hoore, 1993). Other types of clinical information are not present in

claims data, e.g., ejection fraction. However, some clinical conditions may be correlated with missing risk factors, e.g., obesity and diabetes.

We begin our analytic effort by evaluating the ability of the NNECDSG model to predict mortality for the demonstration hospitals using data from the clinical database discussed in Chapter 7. Next, we examine how well a modified NNECDSG model, using only data elements found in claims data, predicts in-hospital mortality for our demonstration sites and with the clinical data base. The third step is to examine the differences in completeness of key clinical and demographic data between the clinical database and Medicare claims for the demonstration sites and how well the claims-based model predicts mortality for the demonstration sites. We then conclude with comparisons in outcomes between the demonstration sites and competitor hospitals.

There are two key questions that we examine in this chapter: (1) are there systematic differences in the severity of patients in the demonstration sites relative to their competitors; and (2) is the trend in lower mortality during the course of the demonstration also observed in the competitor hospitals. Because hospitals have an incentive to select healthier patients under a bundled payment arrangement, it is critical to determine if the demonstration hospitals, do in fact, have a healthier mix of patients. A finding that a declining mortality trend did not exist in the competitor hospitals over the five year demonstration period would provide powerful evidence of a positive effect of bundled payments on the quality and outcome of care.

8.2 Modified NNECDSG Model

Two mortality models based on the NNECDSG model were developed for use in this project. The first model consists of eight variables found to be important predictors of in-hospital mortality in the work by O'Connor and others and that are contained in the demonstration sites' clinical database: age, sex, BSA, history of previous CABG, urgent/emergent admission, ejection fraction, and the Charlson Index. Table 8-1 contains a description of the variables that are used in the multivariate analysis of in-hospital mortality. Age is entered in the model as a continuous variable. Sex is a dichotomous variable (0,1) taking on a value of 1 if the patient is female. BSA, a measure of patient obesity, is entered into the model as a continuous variable. Two dichotomous variables were constructed to reflect (1) whether an admission was urgent or emergent, and (2) whether the patient had a previous CABG. Ejection fraction was categorized in a manner similar to that in the NNECDSG studies and following the scoring developed by Pierpont *et al.* (1985): normal ejection fraction, if greater than or equal to 50 percent; mild ejection fraction dysfunction, if less than 60 percent but greater than 50 percent; moderate ejection fraction dysfunction, if less than or equal to 50 percent and greater than 40 percent; and severe ejection fraction dysfunction, if less than 40 percent.

The Charlson Index was also constructed in a manner similar to that in the NNECDSG studies. The Charlson Index is a summation of weighted co-morbid conditions demonstrated to be strong predictors of cardiovascular-related in-hospital and one-year mortality (O'Connor, 1991; Melfi, 1995; D'Hoore, 1993; Charlson, 1987; Matsui, 1996).

Table 8-1

Description of Variables Used in Multivariate Analysis of Patient Severity

Variables	Description
CHARLSON	Charlson Index value ranging from 0 to 10.
URGMERGE	equals 1 if patient was admitted as urgent or emergent (= 0 is otherwise).
AGE	age as of date of CABG surgery.
SEX	equals 1 if patient was female.
BSA	body surface area calculated as $e^{((-3.751)+(0.422*\ln(\text{height}))+(0.515*\log(\text{weight})))}$
PREVCABG	equals 1 if patient underwent CABG surgery previously (= 0 otherwise).
MILDEJ	equals 1 if patient had a left ventricular ejection fraction between 51-60% (= 0 otherwise).
MODEJ	equals 1 if patient had a left ventricular ejection fraction between 40-50% (= 0 otherwise).
SEVEJ	equals 1 if patient had a left ventricular ejection fraction between less than 40% (= 0 otherwise).
DDEAD	equals 1 if the patient died post-surgery during the hospitalization (= 0 otherwise).

The variables contained in the Charlson Index and their weights (given in parentheses) are given as follows: peripheral vascular disease (1); chronic lung disease (1); dementia (1); chronic liver disease (1); peptic ulcer disease (1); diabetes mellitus with no sequelae (1); diabetes mellitus with sequelae (2); renal failure (2); leukemia, lymphoma, or solid cancer (2); liver disease with sequelae (3); and metastatic cancer or multiple cancers (6). Not all co-morbid conditions are captured in the clinical database. We exclude from our Charlson Index the following variables: chronic liver disease, peptic ulcer disease, liver disease with sequelae, and metastatic or multiple cancers.

A second model was developed to be used in our evaluation of the claims data. This latter model does not contain two variables that are unavailable in claims data: ejection fraction and BSA.

8.3 Claims Data

To conduct this analysis, we use information from the clinical data base developed from detailed medical abstract information collected by the participating demonstration sites and described in Section 7.4.1. In addition, we use Medicare claims data as described in Section 7.4.3. Claims-based indicators are created for the demonstration sites and their competitor hospitals for the time period that is relevant to each of the demonstration sites' participation time frame.

ICD-9 codes, both diagnostic and surgical, present in the claims data are utilized to identify risk factors and complications. The proportion of patients with risk factors such as

diabetes (250.x) and unstable angina (411.1) are estimated from the diagnostic ICD-9 codes present. Post-operative complications are also derived in a similar manner. For instance, a patient is identified as having an infection if ICD-9 codes indicating a post-operative infection are present (996.0-996.69 or 998.5). On the other hand, the use of intra-aortic balloon pump (IABP) before or during surgery is identified by the presence of the procedure code 37.61.

All the claims-based indicators are derived from Part A data except for the information on previous CABG which is obtained from both Part A and Part B claims. Patients with previous CABG are identified from the CPT code (33530) present in Part B data and from previous CABG discharges reported in Part A data.

The Charlson Index developed from the clinical and claims data are similar expect for the weights applied to the cancers. In the clinical data, since metastatic cancers could not be identified separately from others cancers, all cancers received a weight of 2. In the claims data, a weight of 6 is applied to the metastatic cancers that are identified. This difference is not expected to have a significant impact on the overall index estimated as only 1 percent of patients in the claims data have metastatic cancer.

8.4 Evaluation of the Modified NNECDSG Models to Predict Mortality

In this section, we examine the presence of co-morbid conditions as defined in the modified NNECDSG models and estimate the probability of death using logistic regression and the two modified models. Our key issues of interest include: (1) how well do the

modified NNECDSG models predict in-hospital mortality; and (2) is there a significant trend in mortality after controlling for changes in patient severity as measured by the co-variates in the two NNECDSG-modified models.

Four sets of models are estimated for all demonstration sites with in-hospital mortality as the dependent variable. The first of these simply included dummy variables representing six of the seven sites. Hospital C, having the lowest in-hospital mortality rate among the original sites and a participant throughout the entire demonstration, was chosen to be the hospital of comparison, and its mortality rate is represented by the intercept. The hospital coefficient estimates in this first regression thus reflect differences between the six hospitals and Hospital C before controlling for any patient risk factors. These hospital dummy coefficients form a baseline upon which to compare the effects of controlling for demonstration participation time trends and patient risk factors. If none of the hospital coefficients change as the other variables are stepped into the regression, we can conclude that patient mix is uncorrelated with site of surgery among these institutions.

The second model includes the hospital dummies and the demonstration participation time trend variable. Inclusion of the trend variable in this stage tests whether outcomes across all sites differ systematically *as a group* between the early months of the demonstration and the later months. Again, this regression does not control for any patient risk factors. In Chapter 7, we observed no significant time trend, until we controlled for patient risk factors.

The third model steps in the modified NNECDSG list of patient risk factors. This in-hospital mortality model controls for all pre-operative patient risk factors found to be important in the work by O'Connor and others. The fourth model contains only those variables from the NNECDSG list of patient risk factors that are found in claims data. Comparison of Model 4 with Model 3 will provide us with a sense as to how well restricted Model 4 will explain in-hospital mortality between the demonstration and competitor hospitals.

The likelihood ratio chi-square test is used to identify the variables that exhibit a reasonable level of association with the dependent variable. A ten percent confidence level is used as the standard for assessing association and statistical significance. To compare the explanatory ability of the competing hospitals we use two statistical tests. When comparing nested models, we use the likelihood ratio chi-square statistic, G^2. To compare the explanatory ability of non-nested models, we use the *C* statistic, which is a measure of correlation between the predicted probability of a response and the actual response. A value of 1.0 indicates perfect prediction, while a value of 0.5 indicates random prediction. A model with a *C* statistic of 0.75 or greater is generally considered strongly predictive.

Table 8-2 displays mean values by hospital for variables used in the multivariate regression analysis. Table 8-3 displays mean values by calendar year for all demonstration sites. There is considerable variation in the degree of reported patient co-morbidity across the seven demonstration sites ranging from a low of 0.53 in the Charlson Index at Hospital G to a high of 1.89 at Hospital B. The low Charlson Index at Hospital G may explain, in

Table 8-2

Mean Values By Hospital For Variables Used In Multivariate Analysis of Patient Severity

		Hospitals						
	Overall	A	B	C	D	E	F	G
Variable	(N=10,546)	(N=1,256)	(N=3,598)	(N=1,973)	(N=754)	(N=753)	(N=1485)	(N=727)
CHARLSON	1.38	1.31	1.89	0.70	1.23	1.24	1.65	0.53
URGMERGE	0.40	0.63	0.24	0.69	0.47	0.43	0.11	0.47
AGE	71.01	71.48	70.67	71.19	69.75	71.61	71.00	72.00
SEX	0.34	0.36	0.34	0.32	0.34	0.30	0.32	0.34
BSA	1.95	1.91	1.95	1.95	1.93	1.97	1.95	1.93
PREVCABG	0.12	0.09	0.09	0.11	0.22	0.13	0.20	0.22
MILDEJ	0.26	0.22	0.34	0.20	0.12	0.14	0.21	0.12
MODEJ	0.21	0.21	0.22	0.30	0.08	0.10	0.17	0.08
SEVEJ	0.20	0.18	0.16	0.38	0.12	0.11	0.18	0.12
DDEAD	0.05	0.04	0.05	0.04	0.04	0.03	0.08	0.02

SOURCE: Abstracts of clinical records from the demonstration hospitals, May 1991 through June 1996.

Table 8-3

Mean Values By Year For Variables Used In Multivariate Analysis of Patient Severity

Variable	1991 1 (N=1,332)	1992 2 (N=1,423)	1993 3 (N=2,564)	1994 4 (N=2,524)	1995 5 (N=2,698)
CHARLSON	1.06	1.32	1.53	1.46	1.57
URGMERGE	0.30	0.38	0.39	0.50	0.50
AGE	71.00	71.09	71.05	70.05	70.94
SEX	0.33	0.33	0.34	0.34	0.36
BSA	1.94	1.95	1.95	1.94	1.95
PREVCABG	0.17	0.11	0.11	0.10	0.09
MILDEJ	0.22	0.25	0.24	0.32	0.30
MODEJ	0.17	0.18	0.21	0.23	0.25
SEVEJ	0.18	0.19	0.18	0.23	0.22
DDEAD	0.05	0.05	0.05	0.04	0.05

SOURCE: Abstracts of clinical records from the demonstration hospitals, May 1991 through June 1996.

part, the low mortality rate (2 percent) observed during the demonstration period at that hospital, or it could reflect incomplete coding of pre-operative risk factors by Hospital G. Although Hospital B has the highest Charlson Index of the seven sites, it does not have the highest in-hospital mortality rate.

There is also considerable variation across the seven study sites in the proportion of cases that are admitted with a revascularization priority of urgent or emergent. This situation has been discussed in detail in Chapter 7. There is minor variation in average age, the proportion of cases that are female, and BSA. The proportion of cases that have had a previous CABG ranged from a low of 9 percent at Hospitals A and B to a high of 22 percent at Hospitals D and G. These high proportions seem in contradiction to their relatively low Charlson Indices. Lastly, there is considerable variation in the proportion of cases assigned to the three ejection fraction variables. Only about one-third of cases in Hospitals E and G have reported ejection fractions of less than 60 percent. In contrast, Hospital C has almost two-thirds of its cases with reported moderate or severe ejection fractions. There does not seem to be any direct correlation between ejection fraction and the probability of dying across these seven sites. (See last two rows.)

With respect to temporal changes, we observed an increasing level of co-morbidity over time. This is consistent with findings from the NNECDSG. The proportion of cases admitted as either urgent or emergent also increased substantially over the five year period. Age, proportion female, and average BSA remained fairly constant. In contrast, the proportion of cases with a previous CABG actually declined. It also appears that the total

proportion of cases with low ejection fractions also increased. In 1991, 57 percent of all cases were classified in one of the low ejection fraction groups. By 1996, 77 percent of all cases were classified in one of the low ejection fraction groups. The distribution across the three groups appeared to have remained fairly stable. There was no apparent change in the in-hospital mortality rate over the five years of the demonstration.

It is important to note that Table 8-3 is based upon calendar years and *not* on the hospital's year of participation in the demonstration. In Chapter 7, we concluded that there appeared to be a downward trend in mortality related to the length of time the hospital was participating in the demonstration.

8.4.1 Pooled In-Hospital Morality Logistic Regression Results

Table 8-4 reports odds ratios and chi-square p-values for three of the four in-hospital mortality models. Coefficient estimates themselves are not reported because they are not directly interpretable; attention is instead focused on odds ratios that indicate the degree to which the presence of a risk factor affects mortality. The overall model chi-square (and p-value) and the number of observations are included at the bottom of each regression.

Model 1 contains only the six dummy variables indicating the hospital at which the CABG surgery occurred with Hospital C embedded in the intercept. Three of these hospital dummy variables are significant at the 0.10 level or better suggesting some cross-sectional differences in in-hospital mortality, unadjusted for patient severity. The risk of in-hospital mortality is 31 percent higher at Hospital B than at Hospital C and roughly 35 percent lower

Table 8-4

Pooled In-Hospital Mortality Logistic Results

	Model 1		Model 2		Model 3	
Variable	Odds Ratio	P-Value	Odds Ratio	P-Value	Odds Ratio	P-Value
INTERCEPT	0.038 ***	0.00	0.041 ***	0.00	0.001 ***	0.00
STRTDEMO	-	-	0.998	0.57	0.993 ***	0.01
HOSPITAL A	0.97	0.88	0.97	0.88	1.30	0.21
HOSPITAL B	1.31 *	0.06	1.31 *	0.06	2.57 ***	0.01
HOSPITAL D	1.15	0.54	1.15	0.52	2.13 ***	0.01
HOSPITAL E	0.78	0.32	0.76	0.28	1.28	0.37
HOSPITAL F	2.41 ***	0.00	2.35 ***	0.00	4.48 ***	0.01
HOSPITAL G	0.63 *	0.09	0.61 *	0.07	0.85	0.61
CHARLSON	-	-	-	-	1.13 ***	0.01
URGMERGE	-	-	-	-	2.67 ***	0.01
AGE					1.04 ***	0.01
SEX					1.44 ***	0.01
BSA					0.78	0.29
PREVCABG					2.93 ***	0.01
MILDEJ					0.95	0.76
MODEJ					1.60 ***	0.01
SEVEJ					2.50 ***	0.01
No. Observations	10,478		10,474		10,064	
Overall Chi-Square (p-Value)	64.40	(0.0001)	64.70	(0.0001)	264.6	(0.0001)

NOTE:
*** indicates significance at the .01 level, ** at the .05 level, and * at the .10 level.

? The numbers reported here are odds ratios, not regression coefficients (see text). An odds ratio less than 1 represents a negative relationship between the independent and dependent variables.

SOURCE: Abstracts of clinical records from the demonstration hospitals, May 1991 through June 1996.

at Hospital G relative to Hospital C. However, most notable is Hospital F, which exhibits an odds ratio of 2.41 ($p=<0.01$). Thus, patients undergoing CABG surgery at Hospital F are 141 percent more likely to die than patients undergoing CABG surgery at Hospital C. A review of the hospital-specific mean values of pre-operative risk factors does not provide any immediate explanation for such a large difference in relative mortality risk.

Model 2 includes the same hospital dummy variables, as well as the monthly trend variable reflecting the timing of the CABG surgery relative to the hospital entering the demonstration. The same three hospital dummy variables remain significant in Model 2, and their direction and magnitudes are unaffected by inclusion of the time trend variable, which is insignificant as well. As in Chapter 7, we conclude that in the absence of any controls for patient severity, there has not been any statistically discernible trend in pooled in-hospital mortality among the seven sites over the 60 months during which the demonstration has taken place.

Model 3 includes the hospital dummy variables, time trend, and the set of patient risk factors that are contained in the NNECDSG model and the clinical data base. The number of observations in Model 3 (N=10,096) falls modestly from the number of observations used in estimating Models 1 and 2 due to missing values for only a couple of variables included in Model 3. As discussed in Chapter 7, many of the "missing" values were presumed to have been "nos" and set equal to zero in the creation of the dummy variables. All of the hospital coefficients rise with the inclusion of the patient risk variables. Hospital F's odds ratio increases from 2.35 to 4.48 when patient risk factors are entered in the equation. This change

is far greater than found in Chapter 7. We explored this change in considerable detail and conclude that the probability of dying in Hospital F relative to Hospital C is highly dependent upon the specification of the risk factors in the model. Removing the variable URGMERGE returns Hospital F's odds ratio to the level observed in Model 2. This is not surprising given the extremely low proportion of cases reported as urgent or emergent in Hospital F relative to Hospital C (11 percent versus 69 percent). As discussed earlier in this report, there was considerable variation in the definition of urgent/emergent used across the demonstration sites. Apparently, significant numbers of patients at Hospital F die but are not classified as urgent or emergent. Conversely, significant numbers of patients at Hospital C live yet are classified as urgent or emergent. These findings are consistent with the findings reported in Chapter 7 but with a model employing a much larger number of risk factors.

The time trend odds ratio, statistically non significant (p=.57) in Model 2, becomes statistically significant with the inclusion of the patient risk factors, odds ratio = 0.99 (p=.01). The odds ratio of 0.99 means that the risk of dying ***decreased*** by approximately one percentage point for each additional month of participation in the demonstration. Thus, patients who undergo CABG surgery in the second year of a hospital's participation in the demonstration would have an 11 percent lower risk of in-hospital mortality than patients at the outset of the demonstration. This is a highly significant finding and is consistent with the findings reported earlier in the report. Thus, it appears that the trend of decreasing mortality is not overly sensitivity to the specification of risk factors.

Not unexpectedly, many of the patient risk factors are highly significant in Model 3. The risk of in-hospital mortality associated with having undergone previous CABG surgery is highly significant. Those patients with a previous bypass surgery had an odds ratio of 2.93 ($p<.01$) and are 2.9 times more likely to die in-hospital than patients with no previous history of CABG[1]. This high odds ratio suggests that this variable very likely captures high levels of illness severity not measured elsewhere in the model. Revascularization priority (urgent, emergent) also appears to affect in-hospital mortality. CABG patients described as "urgent or emergent" have an in-hospital mortality odds ratio of 2.67, compared to elective patients. With an odds ratio of 2.67 ($p<.01$), an urgent/emergent case is over two and one-half times more likely to die in-hospital than an elective case.

Older CABG patients face significantly increased risks of in-hospital mortality compared to younger patients. For every decile of age, the odds of dying increases by 55 percent ($e^{0.0365*12}$). Women are found to be at significantly higher risk of dying in the hospital then men, with an odds ratio of 1.44 ($p<0.01$). Body surface area, a measure that evaluates weight relative to height, is insignificant in this regression model.

Left ventricular ejection fraction of 50 percent or less is a highly significant ($p<.01$) predictor of in-hospital mortality. Patients with an ejection fraction between 40 and 50 percent are 60 percent more likely to die than similar patients with an ejection fraction greater than 60 percent. Patients with an ejection fraction less than 40 percent are 150 percent more likely to die than similar patients with an ejection fraction greater than 60 percent.

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[1] This odds ratio is almost exactly the one found in Model 4b, Table 7-5, Chapter 7 using the most parsimonious set of risk factors.

Lastly, the odds ratio of the Charlson Index (odds ratio=1.13, $p<0.01$) indicates that the presence of co-morbidities prior to surgery significantly increases the risk of dying. A one unit increase in the Charlson Index raises the risk of dying by 13 percent. Thus, diabetics with sequelae (weight of 2 in the Charlson Index) are 13 percent more likely to die than diabetics without sequelae (weight of 1 in the Charlson Index), *ceteris paribus*. Patients with diabetes and COPD are 26 percent more likely to die in-hospital as compared with patients with no-comorbidities.

To summarize, there is a significant overall time trend in mortality among the demonstration sites, as was demonstrated in Chapter 7, but using here a more limited regression model. Patients who undergo a CABG procedure later in the demonstration (and measured as months since the hospital entered the demonstration) have a lower risk of in-hospital mortality than those that had their CABG earlier in the demonstration period. In addition, three of the six demonstration sites exhibited statistically significant higher in-hospital mortality risk relative to Hospital C, even after accounting for pre-operative risk factors. However, site-specific relative risks appear to be quite sensitive to the pre-operative risk factors included in the regression models. Further, the regression results are consistent with those reported by O'Connor *et al, (1991).* Patients who have had a previous CABG, are older, are female, have lower ejection fractions, who are admitted either urgently or emergently, and who have co-morbid conditions prior to surgery are all at higher risk of in-hospital death following CABG surgery.

In addition, the model's *C* statistic of 0.738 (not discussed earlier) suggests that the model is a fairly strong predictor of in-hospital mortality. Thus, it appears that it is a reasonable candidate for use in our comparison between demonstration and competitor hospitals. In Section 8.4.3, we examine how well this model performs excluding variables unavailable in claims data.

8.4.2 Within-Site In-Hospital Morality Logistic Regression Results

The possibility that the demonstration might result in differing time trends by hospital motivated within-site logistic in-hospital mortality analysis. The results of our within-site logistic regressions are reported in Table 8-5. The risk factors chosen for these regressions are those appearing in Model 3.

The key finding among the site-specific regressions in Table 8-5 concerns the time trend. This variable, statistically significant in the pooled logistic in-hospital mortality full model (odds ratio = 0.99, p=0.03) is highly significant (p<.01) in the regression model for only Hospital A. This variable has an odds ratios less than unity, indicating a ***decrease*** in in-hospital mortality during their participation in the demonstration. Hospital A's unadjusted mortality rate has declined steadily during the 60 months of the demonstration, from an annualized rate of 6.3 percent in 1991 to 1.7 in 1996 (see Appendix Table L-7-2). This finding is similar to the within hospital morality analyses conducted in Chapter 7 with the exception of Hospital F. In the earlier analyses, Hospital F's time trend variable also

Table 8-5

Within-Site In-Hospital Mortality Logistic Results
Model 3

Variable	Hospital A		Hospital B		Hospital C		Hospital D		Hospital E		Hospital F		Hospital G	
	Odds Ratio	P-Value	Odds Ratio	P-Value	Odds Ratio	P-Value	Odds Ratio	P-Value	Odds Ratio ***	P-Value	Odds Ratio	P-Value	Odds Ratio	P-Value
INTERCPT	0.000 ***	0.00	0.001 ***	0.00	0.001 **	0.01	0.473	0.78	0.000 ***	0.01	0.012 **	0.01	0.000 ***	0.00
STRTDEMO	0.971 ***	0.01	0.998	0.76	0.998	0.79	0.997	0.85	1.001	0.97	0.995	0.67	1.015	0.76
AGE	1.078 **	0.01	1.040 ***	0.00	1.077 ***	0.00	0.992	0.64	1.078 *	0.06	1.025	0.16	1.276 ***	0.00
BSA	3.110	0.19	0.701	0.35	0.408	0.23	0.167	0.12	2.480	0.45	0.734	0.56	3.507	0.22
SEX	1.105	0.80	2.034 ***	0.00	0.735	0.37	1.941	0.21	2.883 *	0.06	1.248	0.40	1.597	0.52
PREVCABG	2.432 *	0.08	3.234 ***	0.00	2.398 **	0.02	6.918 ***	0.00	2.755 *	0.07	3.316 ***	0.00	0.544	0.62
CHARLSON	1.296 ***	0.00	1.108 **	0.01	1.380 ***	0.00	1.047	0.72	1.172	0.24	1.097 *	0.10	0.666	0.50
URGMERGE	3.264 **	0.03	2.488 ***	0.00	2.077 *	0.05	2.299 *	0.09	1.083	0.87	5.483 ***	0.00	4.403 *	0.09
MILDEJ	1.100	0.83	1.363	0.27	0.172 **	0.02	1.590	0.44	2.944 *	0.07	0.544 *	0.09	1.553	0.71
MODEJ	0.737	0.58	2.093 ***	0.01	0.332	0.11	2.636 *	0.08	2.723	0.16	1.358	0.28	4.527	0.22
SEVEJ	1.743	0.20	4.427 ***	0.00	0.473	0.26	3.363 **	0.04	3.402 **	0.05	1.622 *	0.08	2.267	0.37
No. Observations	982		3,148		1,665		616		640		1,236		514	
Overall Chi-Square	42.9	0.0001	131.3	0.0001	44.3	0.0001	25.7	0.0041	18.8	0.0434	100.2	0.0001	19.4	0.0352
(p-Value)														

NOTES:

*** indicates significance at the .01 level, ** at the .05 level, * at the .10 level.

* The numbers reported here are odds ratio, not regression coefficients (see text). An odds ratio less than 1 represents a negative relationship between the independent and dependent variables.

** Reduced Form Model includes only those variables with a Wald Chi-Square statistic where $p<0.10$.

SOURCE: Abstracts of clinical records from the demonstration hospitals, May 1991 through June 1996.

demonstrated a statistically significant negative trend. Neither analysis reports any other significant trend in in-hospital mortality during the 60 months of the demonstration.

The risk variables included in the within-site regressions are not, in general, as significant as they are in the pooled analysis, no doubt due largely to reduced sample sizes. Previous CABG — the variable with the greatest quantitative impact on mortality risk in the pooled model — and urgent/emergent revascularization priority are significant in six of the seven site-specific regressions. None of the other variables are consistently strong predictors of in-hospital mortality across the majority of the sites.

The key finding from the within-site in-hospital mortality model concerns the time trend. This variable, statistically significant in the pooled logistic in-hospital mortality model, is highly significant ($p<.01$) in only one site-specific regression model, Hospital A. It has an odds ratio less than unity, indicating a ***decrease*** in in-hospital mortality during its participation in the demonstration. No other sites showed a significant trend in in-hospital mortality during the 60 months of the demonstration. The risk variables included in these within-site regressions were not, in general, as significant as they were in the pooled analysis, no doubt due largely to reduced sample sizes. All of these results are generally consistent with earlier reported findings.

8.4.3 Pooled In-Hospital Morality Logistic Regression Results Using Only Claims-Based Variables

Model 4 was constructed using only the variables from Model 3 that are available in Medicare claims data. The odds ratios and associated p-values of this "reduced-form"

NNECDSG model are displayed in Table 8-6. Model 3 is displayed for comparison purposes.

The overall predictive power of Model 4 falls slightly when ejection fraction and BSA are removed from the regression model. Model 4's *C* statistic is 0.715 as compared with Model 3's *C* statistic of 0.738. Because Model 4 is a nested within Model 3, we also conducted a log-likelihood ratio test. The results of the test do not allow us to reject the null hypothesis that the coefficients of the excluded variables in Model 4 are jointly equal to zero.

The most notable finding in Model 4 is the continuing statistical significance of the time trend variable. The odds ratio remains at 0.99 ($p<0.05$). Once again, this trend appears to hold despite changes in the variables used to capture changes in patient severity over time. Generally speaking, the magnitude of the relative risk estimates in Model 4 do not differ greatly from their counterparts in Model 3. All hospitals exhibit lower risks of dying relative to Hospital C in Model 4 than they do in Model 3. Urgent/emergent revascularization priority, previous CABG, being female or older, and having one or more co-morbid conditions are all strongly and positively associated with a higher risk of mortality.

The key finding from this analysis is that Model 4, a model that contains only variables available in claims data, exhibits strong predictive power and appears to perform as well as a more expansive model that requires clinical information not available in claims data. Also significant is the finding that the time trend variable remains less than unity and is statistically significant.

Table 8-6

Pooled In-Hospital Mortality Logistic Results
Comparison of Full and Reduced Form Models

	Model 3		Model 4	
Variable	Odds Ratio	P-Value	Odds Ratio	P-Value
INTERCEPT	0.000 ***	0.00	0.000 ***	0.00
STRTDEMO	0.993 ***	0.01	0.990 **	0.05
HOSPITAL A	1.30	0.21	0.90	0.59
HOSPITAL B	2.57 ***	0.01	1.77 ***	0.00
HOSPITAL D	2.13 ***	0.01	1.35	0.19
HOSPITAL E	1.28	0.37	0.78	0.33
HOSPITAL F	4.48 ***	0.01	3.12 ***	0.00
HOSPITAL G	0.85	0.61	0.58 **	0.05
CHARLSON	1.13 ***	0.01	1.15 ***	0.00
URGMERGE	2.67 ***	0.01	2.74 ***	0.00
AGE	1.04 ***	0.01	1.04 ***	0.00
SEX	1.44 ***	0.01	1.38 ***	0.00
BSA	0.78	0.29		
PREVCABG	2.93 ***	0.01	3.03 ***	0.00
MILDEJ	0.95	0.76		
MODEJ	1.60 ***	0.01		
SEVEJ	2.50 ***	0.01		
No. Observations	10,064		10,479	
Overall Chi-Square (p-Value)	264.6	(0.0001)	301.9	(0.0001)
C Statistic	0.738		0.715	

NOTE:
*** indicates significance at the .01 level, ** at the .05 level, and * at the .10 level.

? The numbers reported here are odds ratio, not regression coefficients (see text). An odds ratio less than 1 represents a negative relationship between the independent and dependent variables.

SOURCE: Abstracts of clinical records from the demonstration hospitals, May 1991 through June 1996.

8.5 Clinical Versus Claims Data Comparisons

Risk factors and outcomes from clinical abstract data provided by each of the seven demonstration sites are compared to those obtained from Medicare claims data. In Table 8-7, the mean values for patient characteristics, pre-operative risk factors, post-operative complications, in-hospital mortality, and length of stay are presented. Overall mean values (all hospitals combined) are reported along with hospital specific values.

The total number of demonstration patients identified in the claims data are more than those reported in the clinical abstract data (10,546 versus 11,403), but overall for most of the hospitals the number of cases are quite similar. For instance, in the case of Hospital A, the difference is only 4 cases. In spite of the differences in the number of bypass cases, age and gender distributions from the clinical and claims data are identical for the majority of the hospitals.

Several pre-operative risk factors that are important predictors of post-CABG mortality are compared. The combined clinical and claims values, shown in the first two columns in Table 8-7, indicate that the proportion of patients assigned to DRG 106, with the presence of congestive heart failure (CHF), and have had an intra-aortic balloon pump (IABP) inserted pre-operatively are very similar between the two databases. For instance, use of an IABP pre-operatively is reported at 4 percent in both data bases; the presence of CHF is reported at 14 percent in the clinical data and at 15 percent in the claims data.

Other pre-operative risk factors, such as emergency or urgent revascularization priority and unstable angina, differ by more than 10 percentage points across all hospitals and

Table 8-7

Comparison of Mean Values for Demonstration Hospital; Clinical versus Claims Data

Variable	Overall		Hospital A		Hospital B		Hospital C		Hospital D		Hospital E		Hospital F		Hospital G	
	Clinical (N=10,546)	Claims (N=11,403)	Clinical (N=1,256)	Claims (N=1,259)	Clinical (N=3,598)	Claims (N=3,751)	Clinical (N=1,973)	Claims (N=2,028)	Clinical (N=754)	Claims (N=786)	Clinical (N=753)	Claims (N=831)	Clinical (N=1,485)	Claims (N=1,753)	Clinical (N=727)	Claims (N=995)
Patient Characteristics:																
AGE (average)	71 0	70 9	71.5	71 5	70 7	70 7	71 2	71.2	69 7	69.7	71.6	71 5	71 0	70.7	72 0	70.9
SEX	0 34	0 33	0 36	0 36	0.34	0.34	0 32	0.32	0 37	0 36	0.30	0.29	0.32	0 31	0 34	0.34
Risk Factors:																
EMERGENCY/URGENT	0.40	0.51	0.63	0 69	0.24	0.39	0 69	0.68	0 53	0.52	0.43	0.65	0.11	0.44	0 47	0.41
DRG (106=1)	0.45	0.47	0.42	0.42	0.42	0.40	0.50	0.53	0 58	0.60	0.51	0.46	0.48	0.48	0 61	0.60
PREVIOUS CABG	0.12	0.07	0 09	0 04	0.09	0.05	0 11	0.07	0.06	0.03	0.13	0.10	0.20	0.14	0 22	0.08
UNSTABLE ANGINA	0 38	0.51	0.25	0 64	0.59	0.55	0 26	0.43	0 73	0 56	0.02	0.61	0.27	0.43	0.18	0.40
CHF	0 14	0.15	0 24	0 22	0.13	0.15	0 12	0.16	0.15	0.08	0.07	0 11	0.13	0.15	0.06	0 15
DIABETES	0 30	0.24	0.32	0 29	0.29	0.23	0 31	0.23	0 30	0.16	0.28	0.23	0.30	0.23	0 29	0.28
COPD	0 19	0.15	0 15	0 15	0.30	0.21	0 09	0.12	0 09	0.07	0.10	0.10	0.23	0.13	0.11	0.13
HYPERTENSION	0.66	0.45	0 77	0 60	0.65	0.43	0.65	0.45	0.66	0.24	0 58	0.43	0.70	0.49	0 49	0.47
RENAL FAILURE	0 10	0.04	0.09	0 04	0.17	0.03	0 04	0.06	0.08	0.05	0 06	0.04	0.11	0.05	0 01	0.03
IABP	0 04	0.04	0 03	0.03	0.04	0.04	0 01	0.03	0 09	0.03	0.02	0.02	0.05	0.08	0 06	0.04
CHARLSON INDEX	1 38	0 64	1.31	0 71	1.89	0.65	0 70	0 67	1 23	0 47	1.24	0 52	1.65	0.65	0 53	0.63
Post-op Complications:																
POSTOPCM	0 28	0.28	0.38	0 35	0 27	0 19	0.32	0.41	0.30	0.18	0.29	0.30	0.24	0.36	0.09	0.19
PULMONARY	0 11	0 04	0.07	0 03	0 13	0.02	0.12	0.05	0.09	0.04	0.05	0.04	0 13	0.09	0 04	0 02
INFECTION	0 04	0.02	0.05	0 02	0 05	0 01	0 04	0 01	0.05	0.02	0.01	0.00	0.03	0.04	0 01	0.01
RENALCMP	0 02	0 02	0.02	0 03	0 01	0 01	0 05	0.05	0.02	0.03	0.01	0.03	0.01	0.02	0 00	0 02
VASCULAR	0 02	0 00	0.01	0 00	0 00	0 00	0 02	0.01	0.02	0.00	0 13	0.01	0.02	0.00	0 00	0.01
Other:																
IN HOSPITAL MORTALITY	0 046	0.044	0 036	0 033	0.048	0.049	0 037	0.034	0 044	0 042	0.029	0.039	0.085	0.066	0.023	0.028
LOS (average)	10 5	10 7	11 3	11 4	9 4	9.5	10 8	11.1	12 6	12 8	10.0	10 1	11.9	12.1	9 5	9.5

SOURCE: Abstracts of clinical records from the demonstration hospitals and Medicare Claims, May 1991 through June 1996

display considerable variation across the seven hospitals. For example, four of the hospitals report very similar proportions of urgent/emergent admissions. For the three remaining hospitals, the claims data report considerably higher proportions. This is likely a reflection of the use of these two categories to obtain permission for an admission and/or a hospital bed. There is no consistent pattern of differences in reporting of unstable angina. In addition, the proportion with diabetes, COPD, hypertension, and renal failure are consistently lower in the claims versus the clinical data.

Given the differences in reporting of these four risk factors, it is not surprising that there are large variations in the estimates of the Charlson Index. However, the index is consistently lower when estimated from claims data compared to clinical data. Not surprisingly, the two hospitals with the lowest clinical data Charlson Indices, Hospitals C and G, have very similar Charlson Indices derived from the claims data. There is considerably more under-reporting of co-morbidities as reflected in the Charlson Index for the remaining five hospitals.

The overall proportion of any post-operative complications (POSTOPCM) calculated from both databases is identical (28 percent), but within hospitals there are some variations. For instance, post-operative complications obtained from claims data are considerably lower for Hospital B from the clinical data base while the rate is considerably higher for Hospital C. In the case of Hospitals A and E, the proportion of complications obtained from the two data bases is very similar. The clinical and claims data also generate similar proportions of

certain types of complications but not for others. Renal complication rates are very similar, whereas pulmonary complication rates differ substantially.

But, most importantly, the clinical and claims data produce very similar results for in-hospital mortality and length of stay for most of the hospitals. The overall in-hospital mortality reported from the clinical data is 4.6 percent and that from the claims data is 4.4 percent. The average length of stay is 10.5 and 10.7 days from the clinical and claims data respectively. Interestingly, Hospital F's mortality rate is almost 2 percentage points lower when using the claims data as compared with the clinical data. We have no immediate explanation for this large of a discrepancy.

Thus, when pooling across the seven demonstration hospitals similar proportions are produced from the clinical and claims data for patient demographics, certain risk factors, in-hospital mortality, and length of stay. Most pre-operative risk factors though are under-reported in the claims data compared to the clinical data base. These differences between the clinical and claims data may occur largely because claims data have a fixed number of diagnoses and, therefore, may not capture all the risk factors that a patient may have. Other researchers have reported similar results (Hannan *et al.,* 1992; Romano *et al.,* 1994) but, nevertheless, have found claims data to be useful for risk adjustment.

As an additional exploratory exercise, multivariate logistic regression analysis was performed to compare the predictive power of the clinical data relative to the claims data. Table 8-8 contains odds ratios from the logistic estimation performed on the probability of in-hospital mortality using the modified NNECDSG model that contains only those variables

Table 8-8

Pooled In-Hospital Mortality Logistic Results
Comparison Between Models Using Clinical and Claims Data

	Clinical Database		Claims Database	
Variable	Odds Ratio	P-Value	Odds Ratio	P-Value
INTERCEPT	0.000	0.00	0.001 ***	0.00
STRTDEMO	0.990 **	0.05	0.993 **	0.02
HOSPITAL A	0.90	0.59	0.98	0.90
HOSPITAL B	1.77 ***	0.00	1.81 ***	0.00
HOSPITAL D	1.35	0.19	1.60 **	0.03
HOSPITAL E	0.78	0.33	1.05	0.83
HOSPITAL F	3.12 ***	0.00	1.88 ***	0.00
HOSPITAL G	0.58 **	0.05	0.86	0.50
CHARLSON	1.15 ***	0.00	1.27 ***	0.00
URGMERGE	2.74 ***	0.00	1.63 ***	0.00
AGE	1.04 ***	0.00	1.04 ***	0.00
SEX	1.38 ***	0.00	1.50 ***	0.00
PREVCABG	3.03 ***	0.00	3.48 ***	0.00
No. Observations	10,479		11,403	
Overall Chi-Square (p-Value)	301.9	(0.0001)	212.6	(0.0001)
C Statistic	0.715		0.680	

NOTE:
*** indicates significance at the .01 level, ** at the .05 level, and * at the .10 level.

? The numbers reported here are odds ratio, not regression coefficients. An odds ratio less than 1 represents a negative relationship between the independent and dependent variables.

SOURCE: Analysis of clinical and Medicare claims data for demonstration hospitals, May 1991 through June 1996.

that are available in claims data (Model 4). These results are quite similar between the two data bases; however, the ability of the claims to predict in-hospital mortality, as measured by the *C* statistic, falls from 71.5 percent to 68 percent. The trend variable is significant in both logistic regressions, indicating that in-hospital mortality declined over the course of the demonstration as a function of the time the hospital had been participating in the demonstration. Of the three hospitals that have statistically significant higher risk of in-hospital morality relative to Hospital C using the clinical data, two remain statistically significant and positive when estimating the regression equation using claims data (Hospitals B and G). In contrast, Hospital G exhibits a statistically significant lower risk of in-hospital mortality using the clinical data; a difference that disappears when the logistic regression is estimated with the claims data. Hospital D's relative in-hospital mortality risk increases with the use of claims data and becomes statistically significant.

Pre-operative risk factors measured by the Charlson Index, emergency or urgent revascularization priority, age, sex, and previous CABG all significantly ($p<0.01$) increase the risk of in-hospital mortality regardless of data base. Further, the direction and magnitude of effect for all of these variables are very similar.

Although there are differences in the proportions of cases with selected pre-operative risk factors or post-operative complications, we believe the claims data can be used for a comparative analysis between the demonstration sites and their competitor hospitals. We observed that pre-operative risk factors are underestimated in the claims data but this appears to occur consistently across all hospitals. The similarity of the regression results obtained

using the claims and clinical data for the demonstration hospitals provide additional justification for using claims data to perform comparisons between the demonstration and competitor hospitals. And, most importantly, the outcome measure of most interest, in-hospital mortality, is similar in the claims and clinical data. In the next section, claims data are utilized to perform comparative analyses between the demonstration hospitals and their competitors.

8.6 Demonstration Hospitals Versus Competitors: Claims Data Analysis

8.6.1 Univariate Analysis

Risk factors and complications are compared for each of the demonstration hospitals with those of competitors in their market area. All the competitor hospitals in the market area are pooled together for the analysis. In Table 8-9, the results obtained from claims data for each of the seven demonstration market areas are presented.

Overall, there appear to be no real differences between the demonstration and competitor hospitals in each of the markets in terms of age of patients and gender. In addition, there are no discernable patterns among the risk factors obtained for the demonstration and competitor hospitals. For instance, in Market Areas E and F, higher proportions of the patients in the demonstration hospitals have had a previous CABG compared to patients at competitor hospitals; while in Market Areas B and D, the opposite is true. The Charlson Index, one measure of overall severity of patient case mix, suggests that the competitor hospitals had similar or slightly higher levels of patient severity than

Table 8-9

Comparison of Mean Values for Demonstration Hospital versus Competitors

Variable	Market A		Market B		Market C		Market D		Market E		Market F		Market G	
	Demo (N=1,259)	Competitor (N=13,737)	Demo (N=3,751)	Competitor (N=5,860)	Demo (N=2,028)	Competitor (N=13,159)	Demo (N=786)	Competitor (N=13,676)	Demo (N=831)	Competitor (N=1090)	Demo (N=1,753)	Competitor (N=3,668)	Demo (N=995)	Competitor (N=3,502)
Patient Characteristics:														
AGE (average)	71.5	71.9	70.7	70.1	71.2	71.2	69.7	70.4	71.5	71.3	70.7	70.4	70.9	70.7
SEX	0.36	0.34	0.34	0.33	0.32	0.36	0.36	0.33	0.29	0.30	0.31	0.35	0.34	0.35
Risk Factors:														
EMERGENCY/URGENT	0.69	0.61	0.39	0.52	0.68	0.59	0.52	0.63	0.65	0.47	0.44	0.50	0.41	0.62
DRG (106=1)	0.42	0.48	0.40	0.46	0.53	0.45	0.60	0.48	0.46	0.51	0.48	0.61	0.60	0.52
PREVIOUS CABG	0.04	0.05	0.05	0.07	0.07	0.07	0.03	0.11	0.10	0.06	0.14	0.11	0.08	0.08
UNSTABLE ANGINA	0.64	0.41	0.55	0.61	0.43	0.47	0.56	0.34	0.61	0.51	0.43	0.37	0.40	0.65
CHF	0.22	0.17	0.15	0.11	0.16	0.17	0.08	0.16	0.11	0.12	0.15	0.15	0.15	0.17
DIABETES	0.29	0.26	0.23	0.26	0.23	0.26	0.16	0.26	0.23	0.24	0.23	0.24	0.28	0.25
COPD	0.15	0.12	0.21	0.13	0.12	0.16	0.07	0.14	0.10	0.13	0.13	0.13	0.13	0.17
HYPERTENSION	0.60	0.46	0.43	0.47	0.45	0.48	0.24	0.42	0.43	0.41	0.49	0.45	0.47	0.47
RENAL FAILURE	0.04	0.05	0.03	0.04	0.06	0.05	0.05	0.04	0.04	0.08	0.05	0.05	0.03	0.05
IABP	0.03	0.04	0.04	0.02	0.03	0.06	0.03	0.04	0.02	0.05	0.08	0.08	0.04	0.03
CHARLSON INDEX	0.71	0.71	0.65	0.66	0.67	0.73	0.47	0.67	0.52	0.74	0.65	0.68	0.63	0.72
Post-op Complications:														
POSTOPCM	0.35	0.35	0.19	0.36	0.41	0.28	0.18	0.34	0.30	0.29	0.36	0.26	0.19	0.32
PULMONARY	0.03	0.06	0.02	0.13	0.05	0.07	0.04	0.06	0.04	0.08	0.09	0.08	0.02	0.08
INFECTION	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.00	0.01	0.04	0.03	0.01	0.01
RENALCMP	0.03	0.03	0.01	0.03	0.05	0.02	0.03	0.03	0.03	0.04	0.02	0.02	0.02	0.03
VASCULAR	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01
Other:														
IN HOSPITAL MORTALITY	0.033	0.032	0.049	0.049	0.034	0.039	0.042	0.039	0.039	0.043	0.066	0.071	0.028	0.044
LOS (average)	11.4	13.4	9.5	11.0	11.1	12.5	12.8	12.1	10.1	9.8	12.1	13.5	9.5	11.3

SOURCE: Abstracts of claims records from the demonstration hospitals and Competitors, May 1991 through June 1996

demonstration hospitals. The difference is most notable in Market Areas D, E, and G. Interestingly, the demonstration hospitals in these three areas have the lowest Charlson Indices of all seven demonstration hospitals.

Post-operative complications differ substantially among the market areas and between demonstration and competitor hospitals. In Market Areas A and E, the proportion of all cases with any post-operative complication were very similar between the demonstration and competitor hospitals. In Market Areas B, D, and G, demonstration hospitals had significantly fewer cases with complications that competitor hospitals. In contrast, Hospitals C and F have considerably higher rates of post-operative complications than their competitor hospitals.

The in-hospital mortality rates ranged from 2.8 percent in Hospital G to 6.6 percent in Hospital F for the demonstration hospitals. Among competitor hospitals mortality averaged from 3.2 percent in Market Area A up to 7.1 percent in Market Area F. In-hospital mortality rates were either similar or lower among the demonstration hospitals compared to the competitor sites hospitals. The unadjusted in-hospital mortality rates suggest that the bundling of payment under the demonstration did not have a negative impact on patient outcomes as compared to the competitor hospitals' in-hospital mortality rates. In-hospital mortality analysis controlling for patient case mix is presented below.

Length of stay differs among the demonstration and competitor hospitals. Except for two of the demonstration hospitals, D and E, all others had shorter lengths of stay than their competitor hospitals. For example, Hospital G had an average length of stay of 9.5 days,

which is comparatively lower than the 11.3 days for patients undergoing CABG surgery at other hospitals in its market area.

8.6.2 Pooled In-Hospital Mortality Analysis

Table 8-10 presents results from logistic estimation of the probability of in-hospital mortality based on claims-derived risk factors. The pooled regression for the demonstration hospitals (shown earlier in Table 8-8) is compared with a pooled regression for the competitor hospitals located in each of the demonstration hospital's market area. In both cases, demonstration Hospital C and competitor hospitals in market C are the omitted comparison group. The two models in Table 8-10 test whether (a) mortality trends are similar in demonstration versus competitor hospitals, and (b) competitor hospitals exhibit the same relative average mortality rates compared with those in market area C.

The competitor hospitals have a similar in-hospital mortality trend as the demonstration hospitals. This is indicated by the STRTDEMO odds ratio which is significant and less than one in both cases. These results show that despite the bundling of payments that resulted in lower reimbursements to the demonstration hospitals, in-patient mortality trends in the demonstration hospitals did not differ from those experienced by competitor hospitals who were reimbursed in the traditional manner by Medicare. This result supports the conclusion that bundling physician with hospital payments does not lead to a deterioration in patient outcomes as measured by in-hospital mortality.

Table 8-10

Pooled In-Hospital Mortality Logistic Results
Comparison Between Demonstration and Competitor Hospitals

	Demonstration Hospitals		Competitor Hospitals	
Variable	Odds Ratio	P-Value	Odds Ratio	P-Value
INTERCEPT	0.001 ***	0.00	0.001 ***	0.00
STRTDEMO	0.993 **	0.02	0.993 ***	0.02
HOSP/COMP A	0.98	0.90	0.81 ***	0.90
HOSP/COMP B	1.81 ***	0.00	1.43 ***	0.00
HOSP/COMP D	1.60 **	0.03	0.99	0.03
HOSP/COMP E	1.05	0.83	1.09	0.83
HOSP/COMP F	1.88 ***	0.00	1.81 ***	0.00
HOSP/COMP G	0.86	0.50	1.05	0.50
CHARLSON	1.27 ***	0.00	1.28 ***	0.00
URGMERGE	1.63 ***	0.00	1.60 ***	0.00
AGE	1.04 ***	0.00	1.05 ***	0.00
SEX	1.50 ***	0.00	1.45 ***	0.00
PREVCABG	3.48 ***	0.00	2.74 ***	0.00
No. Observations	11,403		54,691	
Overall Chi-Square (p-Value)	212.6	(0.0001)	871.0	(0.0001)
C Statistic	0.680		0.675	

NOTE:
HOSP/COMPA--G: Represents a dummy variable equal to 1 if a demonstration hospital for "Demonstration Hospitals" regression or equals 1 if a competitor hospital discharge for "Competitor Hospitals" regression.

*** indicates significance at the .01 level, ** at the .05 level, and * at the .10 level.

* The numbers reported here are odds ratio, not regression coefficients. An odds ratio less than 1 represents a negative relationship between the independent and dependent variables.

SOURCE: Analysis of Medicare claims data for demonstration and competitor hospitals, May 1991 through June 1996.

In the demonstration hospitals' logistic estimation, Hospitals B, D, and F have a higher probability of in-hospital mortality compared to Hospital C. In the competitor hospitals' logistic regression, hospitals in Market Areas B and F again have a significantly higher likelihood of in-hospital mortality than competitor hospitals in Market Area C. However, based on claims data, competitor hospitals in Market Area A exhibit a lower probability of in-hospital mortality compared to competitor hospitals in area C. Pre-operative risk factors increase the risk of in-hospital death in both the demonstration and competitor hospitals in the same direction and of the same magnitude, with the exception of previous CABG which is relatively riskier in demonstration hospitals.

8.6.3 Market-Specific In-Hospital Mortality Analysis

The modified NNECDSG model using claims data is estimated, next, for each of the seven demonstration markets separately. Two dummy variables, one for demonstration status (DEMO) and another interaction term (STRTDEMO*DEMO) are included in these logits. DEMO takes on a value of 1 if the hospital in a particular market is one of the seven demonstration hospitals; otherwise DEMO is set equal to 0 if the patient was treated by a competitor. A significant coefficient for the DEMO variable indicates differences in in-hospital mortality between the demonstration hospital and competitors at the beginning of the demonstration. The inclusion of the interaction variable (STRTDEMO*DEMO) allows the trend in in-hospital morality to differ between the two groups of demonstration and competitor hospitals. That is, the market-specific mortality trend for competitor hospitals

is captured by the STRTDEMO coefficient while the coefficient of the interaction term tests the marginal difference in trend between the demo and competitor hospitals.

Table 8-11 provides the parameter estimates, standard errors, and the odds ratios for the STRTDEMO, DEMO and STRTDEMO*DEMO variables from the logistic estimation controlling for risk factors. (The risk factor coefficients are not shown.)

In Market A, both the STRTDEMO and the interaction coefficients are negative and statistically significant. The DEMO variable is positive and also significant. Although the demonstration hospital had higher in-hospital mortality at the start of the demonstration (4.9 percent versus 3.2 percent), the demonstration hospital experienced a greater rate of decline than among its competitors, as shown by the magnitude of the odds ratio of the interacted trend variable. Whereas Market A competitor hospitals were experiencing roughly an 8 percent decline in inpatient CABG mortality a year between 1991-96 (=exp[-.007 x 12]-1), the demonstration hospital was averaging 27 percent (=exp[(-007 - .019) x 12)]. Therefore, at the end of the demonstration, the demonstration hospital in fact had lower in-hospital mortality compared to the competitors (1.2 percent versus 2.6 percent).

Competitor hospitals in Market Areas C, D and G, like in area A, experienced declining in-hospital mortality rates. The insignificant interaction coefficient in these sites implies that the demonstration hospitals in these market areas experienced a similar decline in their mortality rates. In addition, the results indicate that in Market Area G, the demonstration hospital had a significantly lower probability of in-hospital mortality than the competitors at the beginning of the demonstration. This result is as expected since the

Table 8-11

Market-Specific In-Hospital Mortality Logistic Trend Coefficients Using Medicare Claims Data

	Market A (N=14,996)		Market B (N=9,611)		Market C (N=15,187)		Market D (N=14,462)		Market E (N=1,921)		Market F (N=5,421)		Market G (N=4,497)	
	Parameter Estimates	Odds Ratios	Parameter Estimates	Odds Ratios	Parameter Estimates	Odds Ratios	Parameter Estimates	Odds Ratios	Parameter Estimates	Odds Ratios	Parameter Estimates	Odds Ratios	Parameter Estimates	Odds Ratios
STRTDEMO	*-0.007* (0.003)	0.993**	*-0.003* (0.003)	0.997	-0.006 (0.003)	0.994**	-0.011 (0.002)	0.989***	0.011 (0.014)	1.011	0.000 (0.006)	1.000	-0.013 (0.008)	0.987*
DEMO	0.527 (0.306)	1.694*	0.109 (0.206)	1.115	-0.121 (0.277)	0.886	-0.711 (0.398)	0.931	-0.070 (0.515)	0.932	0.126 (0.231)	1.134	-0.932 (0.454)	0.394**
STRTDEMO*DEMO	-0.019 (0.010)	0.982**	-0.001 (0.005)	0.999	-0.001 (0.008)	0.999	0.011 (0.010)	1.011	-0.003 (0.022)	0.997	-0.013 (0.010)	0.987	0.027 (0.020)	1.027

NOTE: Standard errors in parenthesis The logistic were estimated controlling for age, sex, previous CABG, emergency/urgent admission, and co-morbid considitions as measured by the Charlson Index *** indicates significance at the 1% level, ** at the 5%, and * at 10%.

SOURCE: Logitistic estimation of probability of in-hospital mortality perfomed on Medicare claims records from the demonstration hospitals and competitors, May 1991 through June 1996.

unadjusted average in-hospital mortality rates were very different, 2.8 at hospital G percent versus 4.4 percent at market area G.

8.7 Conclusions

Overall, the demonstration and competitor hospitals experienced very similar rates of in-hospital mortality over the course of the demonstration. Pooled multivariate regression analyses revealed that both sets of hospitals experienced statistically significant declines in in-hospital morality over the five-year period. These results show that despite the bundling of payments, that resulted in lower reimbursements to the demonstration hospitals, the in-patient mortality trends at the demonstration hospitals mirrored those of competitor hospitals who were reimbursed in the traditional manner by Medicare. This result supports the conclusion that bundling physician with hospital payments does not lead to a deterioration in patient outcomes as measured by in-hospital mortality.

9 Impact of Bundled Payment on Patient-Reported Outcomes, Satisfaction, and Choice of Hospital

9.1 Introduction

This chapter contains results from the patient and physician surveys conducted as part of the evaluation of the Medicare Participating Heart Bypass Center Demonstration. The surveys are an important component of the overall evaluation as they, along with claims data analysis, provide information on a control group of patients who received treatment at competitor hospitals (See Chapter 4 for information on these hospitals). The purpose of the patient survey is to utilize common data collection instruments to compare the experiences of the two groups of beneficiaries, those who were admitted to demonstration hospitals versus competitor hospitals. In addition, the physician survey provides information on the views of the physicians who referred to the demonstration versus the non-demonstration hospitals.

Comparing decisions concerning choice of hospital, satisfaction with care, and post-operative health status between demonstration and non-demonstration patients will help in understanding the impact of bundled payments. The survey analysis addresses several issues as summarized below:

- how patients were triaged to demonstration versus competitor hospitals, and the extent to which knowledge of the demonstration influenced patients and referring physicians choice of hospital for heart bypass surgery

- what factors were most influential in the choice of hospital for patients and physicians
- differences in outcomes between demonstration patients and those that received care at competitor hospitals
- patients' perception of the quality of the services offered at the demonstration hospitals compared to the competitors.

In particular, the information obtained from the surveys will help reveal whether lowering the amount paid for CABG services and altering the manner in which hospitals and physicians were paid adversely effected the perceived care received by the Medicare beneficiaries.

This chapter begins with a discussion of the survey methodology and the response rates obtained. In Section 9.3, a comparison of demographic characteristics and pre-operative health status between the demonstration and non-demonstration patients is presented. Next, the factors that determined the choice of hospital for both patients and referring physicians are explored. In Section 9.6 and 9.7, post-operative health outcomes and patient/physician experience with care are compared between the demonstration and non-demonstration hospitals. Finally, conclusions and policy implications of the survey results are presented.

9.2 Data Sources: Patient and Physician Surveys

9.2.1 Patient and Physician Questionnaires

Both the patient and physician surveys covered a broad range of questions. The patient survey instruments were designed to gather information on all aspects concerning the patients' experience with their most recent bypass surgery (See Appendix J for patient survey instruments). Questions on demographic characteristics, reasons for selecting the hospital, factors influencing the selection decision, experience with care in the facility, pre and post-operative health status, billing procedures, and information about the referring physician were among those included. The questionnaires administered to the demonstration and non-demonstration patients were very similar with the exception of changes to questions regarding choice of hospital.

For the physician interviews, the same survey instruments were utilized for both those who referred to the demonstration hospitals and the competitor hospitals (See Appendix K for physician survey instruments). The questions covered a range of topics including the physician's specialty, referral practices, awareness of the demonstration, factors influencing referral decisions, physician satisfaction with the demonstration hospital (where applicable), and physician satisfaction with competitor hospital (where applicable).

9.2.2 Sampling Methodology

A sample of patients were chosen from those who had been admitted to one of the demonstration hospitals, or local competing hospitals, for their surgeries. The patients were

selected by searching the National Claims History (NCH) impatient files and randomly selecting patients who had received DRG 106 and DRG 107 payments for their surgeries at the demonstration and competitor hospitals during July, August, or September of 1995. Once the patients were identified, their HIC numbers were submitted to HCFA. HCFA searched their Name and Address file to match those patients' HIC numbers with their names and addresses. HER subcontracted with New England Research Institutes, Inc. (NERI), to identify phone numbers for the patients selected and to conduct the surveys.

For the patient survey, the goal was to complete 40 interviews for each of the 7 demonstration hospitals and 40 interviews for competing hospitals in each of the 7 demonstration markets. Therefore, 280 demonstration and 280 non-demonstration patients were expected to be interviewed, resulting in a total of 560 patients.

As part of the survey, patients were asked to identify their primary referring physician. A sample of physicians who referred to the demonstration hospitals and competitor hospitals were selected from this pool. The goal was to complete 20 physician interviews for each of the 7 demonstration hospitals and 20 for competing hospitals in each demonstration market. Thus, a total of 280 physicians were expected to be interviewed.

The survey was administered by telephone to both the patients and the physicians. All patients and physicians received a letter describing the purpose of the survey prior to being contacted by telephone. The potential participants were informed that the survey was being conducted on behalf of HCFA and that if they did not wish to participate they were free to decline an appointment for the telephone interview.

9.2.3 Survey Response Rates

Patients were selected to be sampled through the random number process until the required target of 560 patients was exceeded. The overall response rate for the patient survey was 91 percent and a total of 645 patient interviews were completed. This response rate was calculated as the total number of attempted interviews (645) divided by the sum of the number of completed interviews, refusals (51), and no contact (15). Excluded from the response rate calculation were respondents without working telephones or whose number was unlisted or unpublished (29), deceased (14), non-English speakers (9), those who were hospitalized at the time of the interview or too ill to participate (30), and those who were unreachable for other reasons (34).

Although the overall response rate for the patient survey was excellent, the target of 80 patients, 40 demonstration and 40 non-demonstration at each site, was not always reached. As indicated in Table 9-1, for the demonstration patients this target was met in Atlanta (GA), Ann Arbor (GA), and Houston (TX), while for the non-demonstration patients, the goal was attained in all except Portland (OR). Summed across the sites, 310 demonstration and 335 non-demonstration patients completed the interview.

For the physicians, the number of completed interviews was far lower than the 280 expected interviews. First, the sample of 289 referring physicians identified was much smaller than anticipated. This was because not all patients were able to provide information on their referring physician, and often, the same physician had referred more than one patient. Second, the response rate among those identified was very low. A total of 105

Table 9-1

Number of Patients Interviewed by Site

Site	Attempted Interviews Per Site	Completed Interviews	
		Demo	Non-Demo
Boston, MA	85	31	54
Atlanta, GA	140	93	47
Ann Arbor, MI	109	59	50
Columbus, OH	77	24	53
Houston, TX	97	44	53
Portland, OR	61	31	30
Indianapolis, IN	76	28	48
	645	310	335

NOTE:
See Chapter 4 for details on demonstration and non-demonstration hospitals in each site.

SOURCE: New England Research Institute.

physicians (65 of whom referred to demonstration hospitals and 40 who referred to competitors) were interviewed out of the sample of 286 physicians, for an overall response rate of approximately 37 percent. Reasons for refusal included third parties (secretaries and other "gatekeepers") preventing access to the physician (141), unavailability of the physician (21), refusal by the physician (5), and other reasons (14).

9.2.4 Data Editing and Creation of Analytic Files

The survey responses were reviewed to ensure that the skip patterns in the questionnaire were followed and the number of respondents matched the specified sample sizes. This was performed to ensure that only those respondents who were to provide answers to specific questions did in fact do so. In addition, verbatim responses were reviewed and grouped into meaningful categories to allow for analysis of these responses. In certain cases, responses to the 'other' category were recoded as they did indeed match one of the choices provided for that particular question.

To allow for comparative analysis, the survey responses for the demonstration and non-demonstration patients were combined into a single data file. The survey sample frame was never designed to support site-specific comparisons due to budget limitations. T-tests and chi-square tests were performed to evaluate whether differences between the demonstration and non-demonstration groups were statistically significant. In addition, multivariate regressions were estimated to further investigate differences between the two groups of patients.

9.3 Patient Demographics and Health Status

9.3.1 Patient Demographics

As indicated in Table 9-2, the average age of the demonstration and non-demonstration was 73.81 years and 73.65 years respectively. Although the mean age was very similar, the percentage of respondents who were 78 years of age and older (those in the fourth quartile) is statistically different at the 10 percent level. About 26 percent of the non-demonstration patients were 78 years or older compared to 20 percent of the demonstration patients. Thus, the age distribution between the groups differed, with a larger proportion of the non-demonstration patients being in the oldest age group compared to the demonstration patients.

Non-demonstration patients also had a slightly higher proportion of males (70 percent) compared to demonstration patients (65 percent), but this difference is not statistically significant. Approximately three-quarters of the bypass patients in both groups lived alone and the level of education attained among the groups was similar. About one-quarter of the sample had less than high school education, while one-fifth had at least a college education. There were also no differences in income between the demonstration and the non-demonstration groups. Roughly one-third of the patients received less than $15,000 in annual income but almost 10 percent enjoyed annual incomes exceeding $50,000.

Overall, the demographic characteristics of the demonstration and the non-demonstration patients were quite similar. This indicates that the random selection of participants did result in the desired unbiased comparison group of patients.

Table 9-2

Demographic Characteristics of Demonstration and Non-Demonstration Hospital Patients

	Demo (n=310)	Non-Demo (n=335)
Average Age of Respondent:	73.81	73.65
Percent of Respondents 78 or More Years[1]	20%	26%
Gender of Respondent (% male)	65%	70%
Percent of Respondents who Live Alone	77%	79%
Level of Education Attained (chi-sq = 4.4; p-value = 0.35)		
Less Than High School	22%	25%
High School Graduate	33%	29%
Post High School, or Some College	26%	26%
College Graduate	13%	10%
Graduate Degree	6%	9%
Yearly Income from All Sources[2] (chi-sq = 0.43; p-value = 0.93)		
Less than $15,000	31%	31%
$15,001 to $25,000	30%	33%
$25,001 to $50,000	29%	27%
More than $50,000	9%	10%

NOTE:

[1] Significantly different at 10% level.

[2] 44 (14.2%) demo and 35 (10.5%) non-demo are missing income information.

SOURCE: Health Economics Research, Inc. analysis of Demonstration and Non-Demonstration Patient Surveys administered by the New England Research Institute.

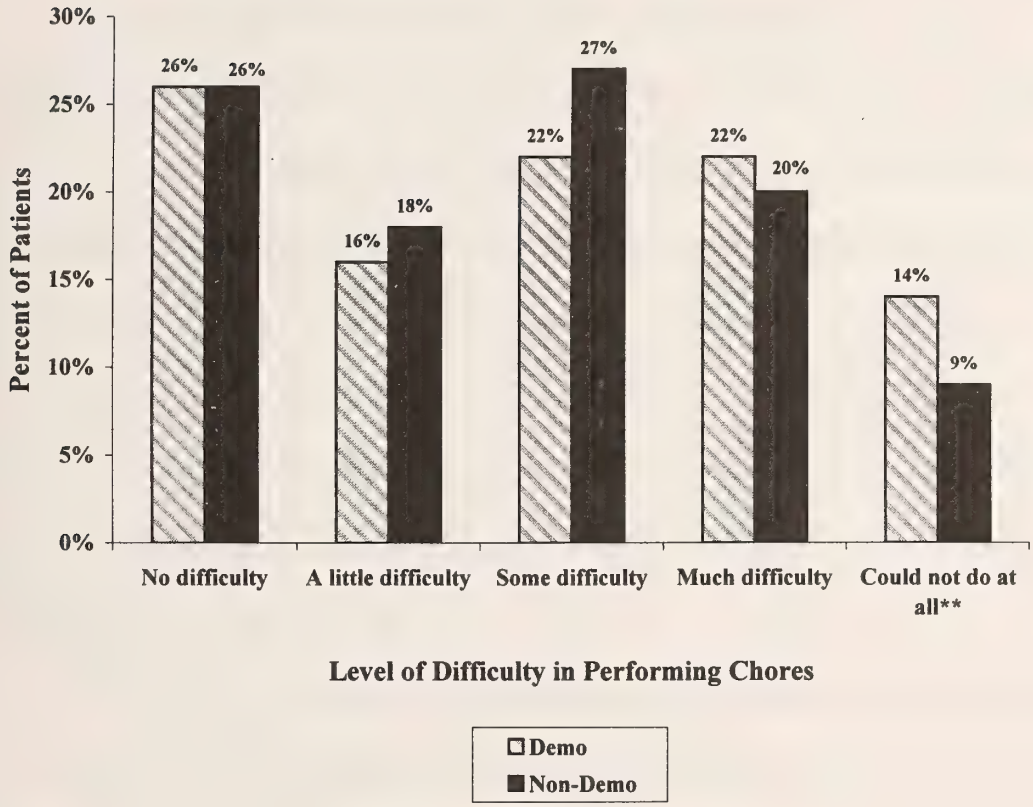
9.3.2 Pre-Operative Health Status

Patients in both the demonstration and the non-demonstration group reported on their ability to perform chores two weeks prior to surgery and these responses are shown in Figure 9-1. In both groups, 26 percent responded that they had no difficulty in completing routine chores prior to surgery. However, 22 percent of the demonstration patients and 20 percent of the non-demonstration patients reported "much difficulty" in completing routine chores. In addition, 14 percent of demonstration patients and 9 percent of the non-demonstration patients were unable to perform any routine chores and this difference is significant at the 5 percent level. Thus, there is some indication that the demonstration patients may have been more severely ill compared to those who were admitted to the competitor hospitals for their heart bypass surgery.

In terms of previous bypass surgery, which is a known risk factor, similar proportions of patients in both groups had had previous bypass surgeries. Only 10 percent of the demonstration and 11 percent of the non-demonstration patients had had a previous bypass and approximately 1 percent in each group had had two or more previous bypass surgeries. Therefore, there was no difference among the patients in the two groups in the proportion with prior bypass surgeries.

Figure 9-1

Patient Reported Difficulty in Completing Chores Two Weeks Prior to Heart Bypass Surgery



NOTE:
** Difference between demonstration and non-demonstration patients is statistically significant at the 5% level.

SOURCE: HER analysis of Demonstration and Non-Demonstration Patient Survey.

9.4 Patient Choice of Bypass Surgery Hospital

9.4.1 Consideration of Another Hospital

Only a minority of the demonstration and non-demonstration patients considered the possibility of attending another hospital apart from the one they selected. As indicated in Table 9-3, 6 percent of demonstration patients and 7 percent of non-demonstration patient considered another hospital. Thus, overall, the patients did not engage in any comparative analysis of hospitals prior to making their selection. Among those who had had a previous bypass, about half of them return to the same hospital for their next bypass. A higher percentage of demonstration patients returned to the same hospital for their next bypass (55 percent) compared to non-demonstration patients (46 percent), but this difference is not statistically significant.

The patients learned about the reputation of the hospital they chose from several sources. About half of the patients heard about the reputation of the hospital from their physician, and another third from family members or friends. Close to 15 percent of the patients also knew about the reputation of the hospital from past experience. Very few of them heard about the hospital from the media. There were no differences between the demonstration and non-demonstration patients in how they learned about the hospital they chose.

The patients were also asked to provide verbatim responses about what they had heard about the hospital they chose. These responses were grouped into five categories and the results are presented in the bottom panel of Table 9-3. Among both groups of patients,

Table 9-3

Patients Consideration of Bypass Surgery Hospitals

	Demo (n=310)	Non-Demo (n=335)
Percentage who considered another hospital apart from one selected	6%	7%
Percentage of those with previous bypass who chose same hospital	55%	46%
How did you learn about the reputation of the hospital you chose?*		
From MD	46%	50%
From Media	6%	6%
From Family/Friends	33%	35%
Hospital staff	5%	3%
Past experience	15%	13%
What do you remember hearing about hospital?		
Good overall reputation	66%	61%
Good reputation for treating heart problems	12%	11%
Positive previous experience	9%	12%
Nice accommodations/other services	1%	1%
No information on quality	12%	16%

NOTE:
*Percentages total to more than 100 as patients could provide multiple responses.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

about two-thirds remembered hearing about the overall reputation of the hospital and about one-tenth mentioned good reputation in treating cardiac problems. A very small proportion of the patients, 1 percent, reported hearing about accommodations or other amenities provided by the hospital. Only 12 percent of the demonstration and non-demonstration patients responded that they received no information on quality. Overall, the demonstration and non-demonstration patients' responses were very similar and not all patients admitted to the demonstration hospitals may have been aware of the specialized programs that were offered.

9.4.2 Awareness of Demonstration Hospital

Among the demonstration patients, 36 percent knew about the demonstration status of the hospital while only 19 percent of the non-demonstration patients had this same knowledge (See Table 9-4). T-test performed on this difference revealed that it is significant at the 1 percent level. In neither case, though, did the knowledge of the demonstration strongly impact the decision to attend the demonstration hospital. Only 32 percent of the demonstration patients who knew about the demonstrations responded that knowledge of the demonstration status of the hospital effected their decision positively to attend the hospital. In fact, 64 percent of the patients who were admitted to the demonstration hospital said that their decision was not affected by knowledge of the demonstration.

In addition, when non-demonstration patients were asked whether knowledge of the demonstration would have effected their decision, 68 percent said it would have made no

Table 9-4

Patient Awareness of Demonstration Hospital

	Demo (n=310)	Non-Demo (n=335)
Percent who knew about demo hospital* **	36%	19%
DEMO PATIENTS ONLY:		
Did knowledge of demonstration hospital affect decision?		
A great deal	32%	N/A
A little	4%	N/A
Not at all	64%	N/A
NON-DEMO PATIENTS ONLY:		
If you knew demo hospital, would you have been		
Much more likely to go there	N/A	6%
A little more likely to go there	N/A	9%
No difference	N/A	68%
Less likely to go there	N/A	17%
Why didn't you decide to go to demo hospital for surgery?		
Just never considered it.	N/A	46%
MD preferred other hospital	N/A	19%
Limited reputation of heart surgery program/surgeons	N/A	8%
Hospitals overall reputation	N/A	4%
Hospital too far away	N/A	13%
HMO/Insurance restrictions	N/A	1%
Personal experience with hospital/advice from family/friends	N/A	4%
Other	N/A	6%

NOTE:
***refers to significance at the 1% level.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

difference. About half the non-demonstration patients never considered the demonstration hospital as a possible choice. For 19 percent of them, their referring physician preferred another hospital. Limited reputation (8+4=12 percent) and location (13 percent) of the demonstration hospital were also cited as reasons for not choosing the demonstration hospital for heart bypass surgery.

9.4.3 Specific Factors Influencing Patient Choice

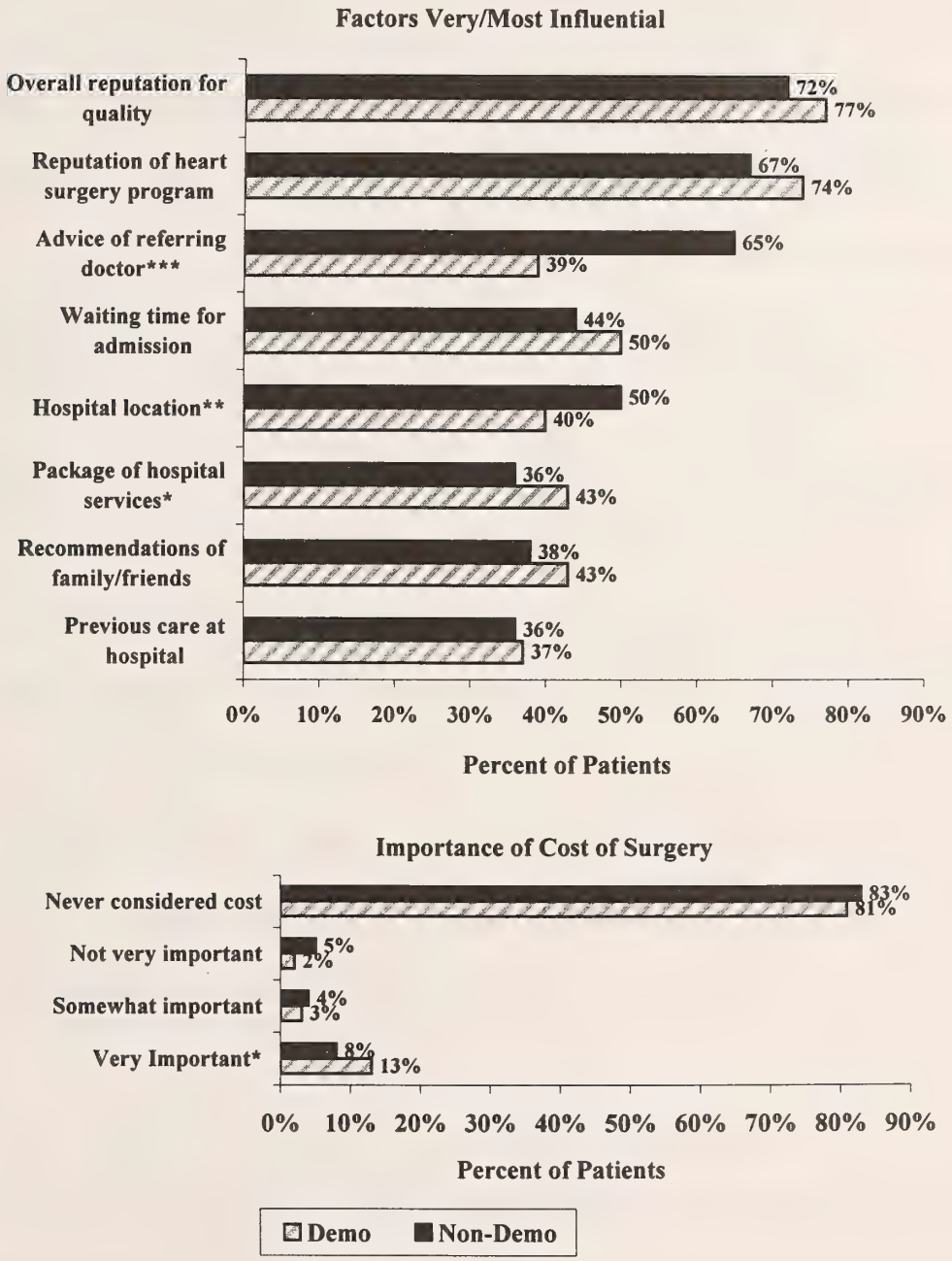
Patients were asked to report on the factors that most influenced their decision to undergo bypass surgery at the hospital they chose. Their answers to each of the factors could range from 0, no influence, to 5, most influential. The percentage reporting very or most influential (4 or 5) is indicated in Figure 9-2.

Patients cited several factors as very or most influential. About 70 percent of demonstration and non-demonstration patients reported that the overall reputation of the hospital for quality and the reputation of the heart surgery program influenced their decision. Among the non-demonstration patients, 65 percent reported that the advice of the referring physician was very or most important compared to 39 percent of demonstration patients. This difference is significant at the 1 percent level.

The referring physician is a key decision maker in the choice of hospital (Luft *et al.*, 1990; Lee & Cohen, 1985), and the physician's opinion seems to have played a more important role among non-demonstration patients than the demonstration patients. Another significant difference was that a higher proportion of non-demonstration patients (50 percent)

Figure 9-2

Factors Influencing Patient Choice of Hospital



NOTE:
*** Refers to significance at 1% level, ** at 5% level and * at 10% level.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Survey.

cited location of hospital as important compared to demonstration patients (40 percent). Travel time and distance are indeed important determinants of hospital choice (Luft *et al.*, 1990; Lee & Cohen, 1985; McGuirk & Porell, 1984), and non-demonstration patients were more likely to visit the hospital that was physically closer to them. This would mean that these individuals might not have wanted to travel to a hospital even if its reputation for success in cardiac surgery was better than a local hospital. On the other hand, demonstration patients were more willing to travel to a hospital to undergo bypass surgery.

In addition, demonstration patients (43 percent) were significantly more likely to report that the package of services offered at the hospital was a very or most influential factor versus patients who were admitted to the non-demonstration hospitals (36 percent). The hospitals that participated in the Medicare Heart Bypass Demonstration did try to advertise the innovative patient and physician oriented programs and services that they had developed. Thus patients who considered these services important may have chosen to have their heart bypass at the demonstration hospitals. Other factors, such as, waiting time for admission, recommendations of family or friends, and previous care at the hospital played very similar roles in the decision of demonstration and non-demonstration patients in choosing the bypass hospital.

Patients were also questioned on the importance they placed on the cost of surgery in their choice of hospital. Over 80 percent of the demonstration and non-demonstration patients responded that they never considered cost, but 13 percent of the demonstration patients indicated that the cost of surgery was very important compared to 8 percent of the

non-demonstration patients. This difference is significant at the 5 percent level and suggests that demonstration patients may have been more cost conscious than non-demonstration patients. These same patients had also reported that the package of services offered at the demonstration hospitals, such as free accommodation and parking which reduces the overall cost of the surgery, was an important factor. There is also evidence in the hospital choice literature that cost is becoming a greater consideration for patients (Dranove, *et al.,* 1993) and thus this result among the demonstration patients is not surprising.

Overall, the demonstration patients placed more importance on the reputation and package of services offered by the hospital than the non-demonstration patients did. They were also more concerned with waiting time for admission than with the location of the hospital. In addition, more demonstration patients compared to non-demonstration patients considered cost of bypass surgery in their choice of hospital. In contrast to the demonstration patients, location of the hospital was an important factor in the choice of hospital for the non-demonstration patients. The non-demonstration patients also relied heavily on the advice of the referring physician and placed almost as much importance on this advice as they did on the reputation of the heart surgery program.

A logistic regression was estimated to identify factors that impact the probability of selecting one of the demonstration hospitals for bypass surgery controlling for differences among patients. Thus, in addition to the factors reported by the patients as influencing their choice of hospital, patient demographics, insurance status, indicators of health status prior to surgery were also included as explanatory variables. The results from the logistic

regression are presented in Table 9-5. Among the demographic factors, gender is the only significant variable. Women were 43 percent more likely than men to choose a demonstration hospital to have their heart bypass surgery. Having supplemental insurance or being a member of a HMO did not significantly determine hospital selection. Health status, indicated by difficulty in performing chores prior to surgery and previous bypass surgery, also did not significantly influence hospital choice.

Among the factors that the patient reported as 'very' or 'most' influential, only hospital location and waiting time for admission were statistically significant at the 5 percent or better level. Those who reported that location was an important factor in influencing choice of hospital were 55 percent less likely to choose a demonstration hospital. On the other hand, those who indicated that waiting time for admission was important had a 51 percent higher probability of having their bypass at a demonstration hospital. This might be a reflection of the fact that hospitals that participated in the demonstration made various attempts to improve efficiency and reduce surgical costs, such as reduction in time between admission and when the surgery was performed. Therefore, the demonstration hospitals may have been successful in reducing waiting time and thereby attracting more patients. Indeed a few demonstration hospitals boasted of their flexible schedules to operate on patients referred to them over the weekend.

Cost of surgery, which appeared to be important in univariate analysis, was statistically significant only at the 15 percent level. Reputation of the heart surgery program was also only significant at the 15 percent level. Other studies have also found that "centers

Table 9-5

Probability of Selecting Demonstration Hospital for Heart Bypass Surgery

	Coefficient	Standard Error	Odds Ratio
Patient Demographics			
Age	-0.22	0.16	0.81
Age-squared	0.00	0.00	1.00
Gender (Female=1)	0.36	0.19	1.43 *
Education (College=1)	0.12	0.17	1.13
Insurance Status			
Supplemental Insurance (Yes=1)	0.05	0.29	1.05
Member of HMO	0.47	0.39	1.61
Health Status Indicators			
Difficulty performing chores prior to surger	0.19	0.19	1.22
Previous bypass surgery	-0.09	0.28	0.91
Factors Influencing Decision			
Cost of Surgery	0.39	0.26	1.48
Recommendation of Family/Friends	0.08	0.19	1.08
Advice of Referring Doctor	0.25	0.20	1.28
Package of Hospital Services	0.09	0.21	1.09
Hospital Location	-8.10	0.21	0.45 ***
Waiting Time for Admission	0.41	0.22	1.51 **
Overall Hospital Reputation for Quality	0.10	0.27	1.10
Reputation of Heart Surgery Program	0.39	0.26	1.48
Other:			
Intercept	6.32	5.71	
Neg. Log Likelihood	810.49 ***		
Sample Size	585		

NOTE:
The significance level for testing whether the coefficient is zero is denoted by * for 10%, ** for 5%, and *** for 1%.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

of excellence" have yet to play an important role in patient choice of hospital (Dranove *et al.*, 1993). All other factors, such as recommendation of family or friends, advice of referring doctor, package of services, and overall reputation of the hospital for quality did not significantly influence choice between demonstration and non-demonstration hospitals.

9.4.4 Physician Involvement in Choice of Hospital

A similar proportion of demonstration and non-demonstration patients discussed their bypass hospital or surgeon with their referring physician. As indicated in Table 9-6, about a third of the patients discussed their choice with the referring physician. The most common reasons for not having such a discussion were due to an emergency admission, patient had already made the decision, or the patient trusted the physician to make the correct decision.

Patients felt that their physician referred them to a particular hospital largely because of the reputation of the hospital. Among the demonstration patients, 60 percent cited this reason compared to 43 percent of the non-demonstration patients. This difference is significant at the 1 percent level. Fewer demonstration patients (21 percent) compared to non-demonstration patients (31 percent) cited physicians' familiarity with the hospital as the reason for referral. In addition, 13 percent of demonstration versus 18 percent of non-demonstration patients responded that the physician referred the hospital because it was their choice and this is a statistically significant difference. Further information on the referring physicians' choice of hospital is provided in the next section.

Table 9-6

Physician Involvement in Choice of Bypass Surgery Hospital

	Demo (n=310)	Non-Demo (n=335)
Percent who discussed hospital/surgeon with MD?	36%	30%
If patient didn't talk with MD, why not?		
Emergency admission/already admitted	44%	37%
Had already decided	16%	18%
Didn't question MD/trusted MD	31%	35%
MD practices at hospital	6%	8%
No MD/MD not available	2%	2%
In HMO with designated hospital	1%	0%
Why did MD recommend hospital?		
Thought it was a good hospital/Had good past experience	60%	43%
Knew surgeon/affiliated with hospital	21%	31%
Was patient's choice	13%	18%
Close to home/Previous record were there/little time to search	3%	3%
This hospital better equipped	1%	3%
Had bad experience at other hospital	1%	0%
Other hospital didn't do by-pass	1%	1%

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

9.5 Referring Physician Choice of Hospital

9.5.1 Characteristics of Referring Physician

The most common specialty of physicians referring bypass patients were cardiologists, followed by general internists, and family practitioners. For the demonstration patients, 40 percent of the referring physicians were cardiologists while for the non-demonstration patients this proportion was higher at 54 percent (See Table 9-7). This difference though is not statistically significant. On the other hand, physicians who had been referring cardiac patients to their primary hospital for a shorter period of time had a higher probability of admitting their patients to a demonstration hospital. About 30 percent of demonstration patients were referred by physicians who had been referring to the hospital for less than 5 years compared to 14 percent of the non-demonstration patients. A t-test performed on this difference indicated significance at the 10 percent level. In addition, although not statistically significantly different, physicians who made fewer referrals were more likely to refer to the demonstration hospitals. About 70 percent of demonstration patients were referred by physicians who referred fewer than 50 patients annually compared to about 55 percent of the non-demonstration patients.

9.5.2 Physician Awareness of Demonstration Hospital

As part of the physician questionnaire, the physicians were asked about their awareness of the demonstration status of the hospital in their area. Only about two-thirds of the referring physicians were aware of the demonstration status of the hospitals as indicated

Table 9-7

Characteristics of Physicians who Refer to Demonstration Versus Non-Demonstration Hospitals

	Demo (n=65)	Non-Demo (n=40)
Practice Specialty of Referring Physician		
Cardiology	40%	54%
General Internal	25%	25%
Gerontology	15%	8%
Family Practice	15%	11%
Other	5%	3%
How many years have you been referring cardiac patients to your primary referral hospital?		
Less than 5[1]	30%	14%
5 to 10	24%	28%
11 to 20	33%	38%
More than 20	13%	20%
How many referrals per year do you make to this hospital for possible revascularization?		
Less than 10	23%	14%
10 to 50	48%	42%
51 to 100	21%	23%
More than 100	8%	22%

NOTE:
[1] Significantly different at the 10% level.

SOURCE: Health Economics Research, Inc. analysis of Heart Demonstration Bypass Physicians Surveys administered by the New England Research Institute.

on Table 9-8. Many of the physicians learned about the demonstration through hospital presentations or publications (29 percent) or from colleagues (21 percent). Some of the physicians (14 percent) had also themselves participated in submitting applications to qualify for the demonstration. Others heard about the demonstration through the media or medical conferences.

Knowledge of the demonstration did not change the referral pattern of the physicians: 98 percent responded that it did not have any effect. In addition, the referral pattern remained mostly unchanged from the previous year. About 74 percent of the physicians reported that their referral pattern to the demonstration hospital remained the same as the previous year and only 12 percent referred more patients.

The main reasons why physicians did not refer patients to the demonstration hospital were because they were comfortable with the services at another facility (26 percent), preferred location of competing hospital (21 percent), or lacked admitting privileges at demonstration hospital (18 percent). The technical competence of the demonstration physicians (13 percent), lack of familiarity with the demonstration hospital (13 percent), and other reasons (10 percent) were also cited.

9.5.3 Factors Influencing Physician Choice of Hospital

Physicians responded to questions on the proportion of their patients whose choice was influenced by various factors and these results are shown in Table 9-9. In 40 percent of the cases, the patients' expressed preference was the driving factor and in another 15 percent

Table 9-8

Physician Awareness and Referrals to Demonstration Hospitals

ALL PHYSICIANS (n=105)	
Percentage aware that hospital was participant in demonstration	64%
How learn of demonstration at the hospital?	
Hospital Presentation/Publication	29%
Colleague	21%
Involved in Demonstration Application	14%
Direct Mail	10%
Medical Conference/Association	8%
TV/Radio/News media	7%
Other	1%
PHYSICIANS WHO REFER TO DEMONSTRATION HOSPITALS (n=65)	
Did your referral pattern change because of your knowledge of the demonstration?	
No	98%
Yes	2%
Number of Referrals to demo Hospital: This Year vs. Last Year	
About the Same	74%
More	12%
Fewer	14%
PHYSICIANS WHO DO NOT REFER TO DEMONSTRATION HOSPITAL (n=40)	
Why don't you refer cardiac patients to the demo hospital?	
Comfortable with another hospital	26%
Hospital Location/Accessibility	21%
No admitting privileges	18%
MD technical competence	13%
Not familiar with demo hospital	13%
Other	9%

SOURCE: Health Economics Research, Inc. analysis of Bypass Heart Demonstration Physician Surveys administered by the New England Research Institute.

Table 9-9

Factors that Influence Physician Choice of Hospital

ALL PHYSICIAN (n=105)	
Percent of patients whose hospital choice was affected by:	
Lack of insurance	3%
Restricted by Insurance Plan	15%
Patient preference of hospital	40%
Condition best served by hospital	15%
Affected by wait/scheduling difficulties	3%
Very or Most influential in physician choice of hospital	
Relationship with staff	90%
Demonstrated superiority of surgical outcomes	84%
Hospital's reputation	73%
Communication with hospital	66%
Special programs/services	23%
Special services to patients	27%
PHYSICIANS WHO REFERRED TO DEMONSTRATION HOSPITALS (n=65)	
Symptoms or Characteristics that might cause physician to refer patient to certain hospital	
Risk Factors/Medical condition	16%
Refer all patients to same hospital	16%
Non-clinical factors	68%
Kind of patients sent to demo hospital	
More severely ill	28%
Less severely ill	6%
No distinction	66%

SOURCE: Health Economics Research, Inc. analysis of Bypass Heart Demonstration Physician Surveys administered by the New England Research Institute.

of the patients their choice was restricted by their insurance plan. Only 15 percent of the referrals were made based on the best match of the patient's condition with a particular hospital.

The physicians also responded to questions concerning the factors that influenced their choice of hospital. Ninety percent of them reported that their relationship with the hospital staff was critical. The demonstrated superiority of surgical outcomes (84 percent) and hospital reputation (73 percent) were also important factors. In addition, 66 percent of the physicians believed that the frequency and quality of the communications with the hospital affected their referral pattern. Factors of lesser importance were special programs such as patient education and telephone-based consultations (23 percent), and special services offered to patients such as assistance with lodging and parking (27 percent).

Among physicians who referred to the demonstration hospitals, only 16 percent of the physicians reported that clinical risk factors might cause them to refer a patient to a particular hospital. In fact, 68 percent of them reported that non-clinical factors, such as patients' preference and insurance restrictions were the factors that determined the hospital chosen to undergo bypass surgery. The majority, 66 percent, also said that they made no distinction in the type of patient they referred to a demonstration hospital. About 28 percent of the physicians responded that they referred patients who were more severely ill to the demonstration hospital versus 6 percent who responded that they referred less severely ill patients. Thus, in general, physicians were about 4.7 times more likely to refer severely ill patients compared to less severely ill patients to the demonstration hospitals.

9.6 Complications and Post-Surgery Health Status

9.6.1 Frequency of Complications and Readmissions

The proportion of post-operative complications and readmissions were very similar between demonstration and non-demonstration patients as indicated in Table 9-10. The most common complaints were breathing problems, with 12 percent of demonstration and 11 percent of non-demonstration patients reporting these complications. The second-most common complaint was infection. About 5 percent of demonstration and 9 percent of non-demonstration patients developed infections, but this difference is not statistically significant. Reoperations, pneumonia, and kidney problems each accounted for about 1-5 percent of complications in each group. Other types of complications, such as stroke and those resulting from diabetes, occurred in 16 percent of demonstration and non-demonstration patients.

Readmission to any hospital after surgery occurred among 40 percent of the demonstration patients and 38 percent of non-demonstration patients. Only 34 percent of these demonstration patients were readmitted for a heart condition compared with 45 percent of non-demonstration patients. This difference is statistically significant at the 10 percent level and could indicate that the demonstration hospitals were more successful in treating the cardiac problems of their patients than the competitor hospitals.

Table 9-10

Frequency of Complications and Readmissions

	Demo (n=310)	Non-Demo (n=335)
Did you suffer any of these complications?		
Return to OR	1%	5%
Infection	5%	9%
Pneumonia	2%	2%
Breathing Problems	12%	11%
Kidney problems/Dialysis	3%	2%
Other complications	16%	16%
Have you been readmitted to any hospital since surgery?	40%	38%
Not heart related*	47%	36%
Heart related*	34%	45%
Not clear	19%	19%

NOTE:
* Significant at the 10% level.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

9.6.2 Improvement in Overall Health Status

As shown on Table 9-11, more than 50 percent of the demonstration and the non-demonstration patients reported their health to be excellent or very good after bypass surgery. Only 4 percent of the patient indicated that their health was poor. The health status reported by the demonstration and non-demonstration patients were not different and a similar proportion of them indicated that the surgery helped them. About 75 percent of demonstration and non-demonstration patients reported that the surgery helped them "a lot."

Patients were also asked about their ability to perform work, recreation, and chores inside and outside the house both before and after bypass surgery. The ability to perform chores and other activities was ranked from a scale of '1' to '5', with '1' indicating no difficulty and '5' referring to the inability to do them at all. As discussed earlier, the ability to perform chores in the two weeks prior to surgery was very similar between demonstration and non-demonstration patients. The ability to perform chores after the bypass surgery, again, is also very similar, as shown in Figure 9-3. About 35 percent reported no difficulty in performing chores and other activities. In both groups of patients the proportion who reported no difficulty with chores significantly rose after surgery. Thus, with surgery the demonstration and non-demonstration patients both experienced improvement in health status.

Table 9-11

Patient Post-Recovery Health Status

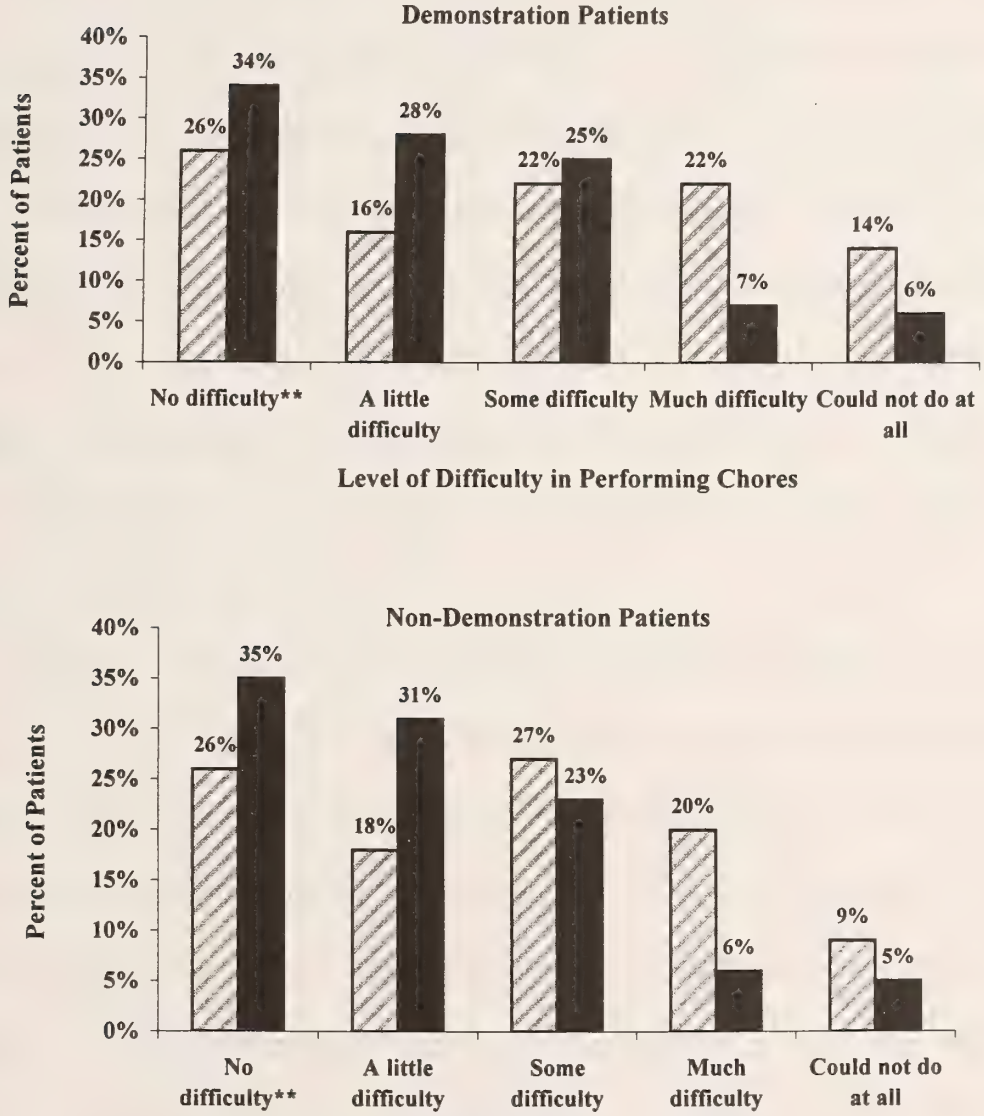
	Demo (n=310)	Non-Demo (n=335)
Health status after surgery		
Excellent	19%	21%
Very Good	33%	30%
Good	31%	33%
Fair	13%	12%
Poor	4%	4%
To what degree did surgery and care help patient		
A lot	73%	75%
Somewhat	22%	23%
No Real Help	5%	2%

NOTE:
Demonstration and non-demonstration patient responses are not statistically different.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

Figure 9-3

Patient Reported Difficulty in Performing Chores Before and After Surgery



NOTE:
** Indicates a statistically significant difference (at the 5% level) before and after surgery.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Survey.

Although there definitely was an overall improvement in health in both the groups, not all patients reported an improvement. This is revealed by the "work improvement scale" shown in Table 9-12. The scale is constructed by subtracting the value reported for ability to perform chores before surgery from that after surgery. The ability to perform chores ranged from 1 to 5; change can have values ranging from –4 to +4. A score of "-4" would indicate that the patient reported a "1" (no difficulty) prior to surgery and then a "5" (unable to do) after surgery. On the other hand a "+4" would refer to a patient reporting a "5" prior to surgery and a "1" after surgery. A value of "0" would mean that there was no difference is ability to perform chores and other activities before and after the bypass surgery. All negative values of the "work improvement scale" indicate deterioration after surgery while all positive values indicate improvement.

In general, we would expect an improvement in the ability to perform chores and other activities after surgery; yet, only about 50 percent in both groups did better after surgery. Close to 30 percent indicated that there was no change in their ability to perform chores and other activities, and about 20 percent reported that their condition worsened. Among the latter, most reported that their ability deteriorated by one or two points on the scale and only a small percent had experienced a large decline in the ability to perform activities. No significant difference in the proportions was found between demonstration and non-demonstration patients.

It is possible that given the advanced age of some of the patients, surgery may not have significantly improved their ability to perform chores. Verbatim responses offered by

Table 9-12

The Change in the Ability to Perform Chores and Other Activities Pre- and Post-Surgery

Change in Ability to Perform Chores*	Demo (n=310)	Non-Demo (n=335)
4	3%	2%
3	11%	10%
2	14%	17%
1	22%	19%
0	29%	31%
-1	10%	11%
-2	8%	7%
-3	1%	2%
-4	2%	1%

Chi-square: df = 8, value = 3.661, Pb. = 0.886.

NOTE:
Patients reported on a 1- 5 scale of how difficult it was to complete chores (1 = not difficult, 5 = unable to do). Change was measured as ability to perform chores prior to surgery minus ability to perform chores after surgery.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

the patients provide evidence that advanced age was a major reason for inability to do chores. In addition, many patients were admitted on an emergency basis, and it is likely that the patients may have reported being in excellent health two weeks prior to surgery only because they were unaware of their heart condition.

Multivariate regression was performed to test whether there was any difference between the demonstration and non-demonstration patients in improvement in performing chores and other activities after controlling for demographic and health status differences between the groups. An ordinary least squares regression was estimated using change in ability to perform chores (shown in Table 9-12) as the dependent variable.

The regression results are presented in Table 9-13. Age is non-linearly related to improvement in ability to perform chores. The relationship between the patients' age and improvement in the ability to perform chores is an inverted U. The results could indicate that the younger Medicare enrollees, those under 65 and disabled, and older enrollees may not have experienced as much improvement compared to those in the middle age group. In fact, maximum improvement occurred at age 75.

It appears that women and those with previous bypass surgery were less likely to experience an improvement, although the coefficient for previous bypass is not significant at the 10 percent level. Difficulty in performing chores prior to bypass surgery is highly significant as would be expected. That is, those who had more difficulty before the surgery were more likely to experience an improvement after surgery.

Table 9-13

Improvement in Ability to Perform Chores After Heart Bypass Surgery

	Coefficient	Standard Error	T-value
Dependent Variable:			
Change in Ability to Perform Chores			
Independent Variables:			
Age	0.39	0.02	6.25 ***
Age Squared	-0.01	0.00	4.70 ***
Gender (Female=1)	-0.26	0.10	2.73 ***
Difficulty performing chores prior to surger	0.90	0.03	26.91 ***
Previous bypass surgery	-0.22	0.14	-1.56
Bypass at Demonstration Hospital	-0.03	0.09	-0.37
Intercept	-16.20	2.92	5.55 ***
R-squared	0.54		
Sample Size	635		

NOTE:

The significance level for testing whether the coefficient is zero is denoted by * for 10%, ** for 5%, and *** for 1%.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

The dummy variable indicating bypass at a demonstration hospital is not significant. This supports the conclusion reached earlier that there was no difference between the demonstration and non-demonstration patients in improvement in ability to perform chores and other activities.

9.6.3 Improvement in Ability to Perform Specific Activities

Apart from the ability to perform chores, patients were also asked to report on the activities they could perform after surgery without pain but could not prior to surgery. All the responses provided are shown in Table 9-14 along with the percentage of patients who participated in each of the activities. For instance, 94 percent reported on their ability to climb a flight of stairs whereas only 12 percent played golf.

Significant differences in the ability to walk two or more blocks and to garden were reported among the demonstration and non-demonstration patients. Demonstration patients were better able to perform these two activities compared to the non-demonstration patients (50 compared to 36 percent reported improvement in ability to walk and 45 compared to 33 percent reported improvement in ability to garden). These differences are significant at a 1 percent level. There were no differences in the ability to perform other activities, such as climbing stairs, playing tennis/golf, and swimming.

Logistic regressions were estimated for improvements in the ability to perform some of the activities discussed above – walking two blocks, climbing stairs, and gardening. The regressions were estimated controlling for age, gender, and health status, as shown on

Table 9-14

Ability to Perform Activities Without Pain After Surgery

	Percent of Patients Responding	Demo (=310)	Non-Demo (n=335)
Climb a flight of stairs	94%	44%	38%
Walk 2+ city blocks***	93%	50%	36%
Playing Golf	12%	17%	25%
Playing Tennis	18%	10%	4%
Swimming	32%	29%	20%
Gardening***	65%	45%	33%
Other activity(ies)	97%	28%	28%

NOTE:
*** Refers to significance at the 1% level.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

Table 9-15. Similar to the results provided by the univariate analysis, demonstration patients had greater improvements in walking two or more blocks and in gardening, but no difference in climbing stairs. Demonstration patients had a 84 percent greater probability of experiencing improvement in walking and were 64 percent more likely to be able to garden without pain after surgery controlling for demographic differences (age and gender) and health status prior to surgery.

9.7 Satisfaction with Care in the Hospital

9.7.1 Patient Satisfaction with Care

Patients were asked to report on their satisfaction with care received in the hospital. Topics included satisfaction with nurses and physicians, satisfaction with length of stay, and overall satisfaction. Answers were given on a scale of 1 to 5, with 1 being the worst and 5 being the best.

The proportion of patients who reported that they received "very good" or "best possible" care is indicated in Table 9-16. In general, a high percentage of patients were satisfied with care received in both the demonstration and non-demonstration hospitals. Close to 90 percent of the patients in both groups rated the "responsiveness of the nurses" as very good or better. In addition, 85 percent of demonstration and 86 percent of non-demonstration patients reported that they were very satisfied with the information the nurses provided on their care. One significant difference at the 5 percent level is that a higher

Table 9-15

Odds Ratios for Improvement in Activities - Those That can be Performed Without Pain After Surgery

	Walking Two Blocks	Climbing Stairs	Gardening
Dependent Variable:			
1 if improvement in ability to perform activity;			
0 otherwise			
Independent Variables:			
Age	1.71 ***	1.19	1.63 *
Age Squared	0.99 ***	0.99	0.99
Gender (Female=1)	0.96	0.82	0.94
Difficulty performing chores prior to surgery	2.02 ***	1.99 ***	2.13 ***
Previous bypass surgery	0.91	0.91	0.95
Bypass at Demonstration Hospital	1.84 ***	1.26	1.64 **
Neg. Log Likelihood	808.66	816.85	557.07
Sample Size	593	603	416

NOTE:
The significance level for testing whether the coefficient is zero is denoted by * for 10%, ** for 5%, and *** for 1%.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

Table 9-16

Patient Satisfaction with Care Received at the Hospital

	Demo (n=310)	Non-Demo (n=335)
Percent Reporting Very Good or Best Possible Care		
Responsiveness of nursing staff	89%	87%
Usefulness of information provided by nurses	85%	86%
Overall skill of nurses**	92%	86%
Attentiveness of doctors	91%	91%
Overall skill of doctors	97%	95%
Accommodations provided for family and friends	84%	83%
Plans and information regarding care needs and what to expect after discharge	88%	89%
Overall quality of care and services received in hospital	93%	90%
How long were you in hospital before surgery?		
Same day**	37%	29%
1 day after	37%	40%
2 or more days	24%	30%
How many days passed between diagnostic test and surgery?		
0***	29%	20%
1	32%	31%
2	10%	11%
3 to 6	18%	17%
7 to 10	6%	8%
11 or more***	4%	12%
Was length of stay		
Too long	3%	5%
About right**	85%	80%
Little short	9%	13%
Very short	3%	2%

NOTE:

**Statistically significant at 5% level.

***Statistically significant at 1% level.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

proportion of demonstration patients (92 percent) indicated that they were very satisfied with the overall skill of the nurses compared to the non-demonstration patients (86 percent).

The "attentiveness of doctors" was rated "very good" or "best possible" by 91 percent of both demonstration and non-demonstration patients. They also rated the skill of their doctors very highly (97 percent of demonstration patients and 95 percent of non-demonstration patients). Patients in both groups reported similar high levels of satisfaction with accommodations provided to family and friends, and with information on what to expect after discharge. Satisfaction with overall quality of care and services received was also high in both groups with 93 percent of demonstration patients and 90 percent of non-demonstration patients reporting that it was "very good" or "best possible". With the one exception, satisfaction with overall skill of the nursing staff, patient satisfaction with care received in the hospital was essentially similar between the demonstration and non-demonstration patients.

Demonstration hospital patients on average spent less time in the hospital than their non-demonstration counterparts, as shown on Table 9-16. The proportion of patients undergoing surgery the same day they entered the hospital varied between the two groups with 37 percent of demonstration patients and 29 percent of non-demonstration patients reporting same-day surgery. This difference is significant and could have been a result of the demonstration hospitals' efforts to improve efficiency and reduce costs by scheduling surgery more rapidly than competitor hospitals. The higher percentage of demonstration patients undergoing same day surgery may also be due to a higher proportion of demonstration

referrals in which the cardiac catheterization procedure was performed elsewhere first. In addition, 29 percent of demonstration patients reported zero days passing between testing and surgery, while only 20 percent of non-demonstration patients reported zero days elapsing; again, this difference is statistically significant. As expected, a greater percentage of the non-demonstration patients (12 percent) reported 11 or more days between tests and surgery compared to the demonstration patients (4 percent).

Although the demonstration patients on average stayed fewer days that those admitted to competitor hospitals, a statistically significant, higher proportion of demonstration patients (85 percent) compared to non-demonstration patients (80 percent) felt that their length of stay was "about right." Thus, patients who were admitted to the demonstration hospitals were more satisfied than those admitted to competitor hospitals with the length of time they spent at the hospital. It was neither too short nor too long.

9.7.2 Satisfaction with Insurance Billing

The vast proportion (90 percent) of all surveyed patients had supplemental insurance coverage to the basic Medicare provisions, and only a small percent (about 5 percent) were members of HMOs (See Table 9-17). There were no differences among demonstration and non-demonstration patients in supplemental insurance or HMO membership. Thus, any difference that may have been noticed by the patients in the billing procedures can be attributed to the bundling of payments under the demonstration and not to coverage differences.

Table 9-17

Patient Experience with Insurance Billing

	Demo (n=310)	Non-Demo (n=335)
Patients with insurance in addition to Medicare?	90%	89%
Patient member of HMO	6%	4%
Patient experience with billing process		
Easier than expected***	62%	43%
What was expected	32%	44%
More difficult than expected	6%	13%
Number of bills received		
None***	24%	10%
One***	18%	5%
Two	8%	3%
Three to five	22%	17%
Six to ten	13%	22%
Eleven or more	15%	43%
Out-of-pocket expenses		
Higher than expected	10%	11%
What was expected	44%	49%
Lower than expected	46%	40%

NOTE:
*** Indicates significance at 1% level.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Patient Surveys administered by the New England Research Institute.

Demonstration providers were prohibited from billing their Fiscal Intermediaries and Carriers, and instead had to assemble a combined package of bills (hospital and physicians) and submit then to HCFA's Office of Research and Demonstrations. Demonstration patients were only obliged to pay a fixed coinsurance amount, after paying any outstanding deductibles. For non-demonstration patients, payment responsibilities depended on the number and types of physician and supplier services they received while an inpatient.

As can be expected, under the demonstration, patients found the billing process to be easier than they had expected. Of the demonstration patients, 62 percent responded that it was easier compared to 43 percent of the non-demonstration patients. This difference is significant at the 1 percent level. Another significant difference is that demonstration patients were far more likely to receive fewer bills. In fact, 42 percent of the demonstration patients received one or no bills (versus only 15 percent of the non-demonstration patients) whereas 65 percent of non-demonstration patients received six or more bills (versus 28 percent of demonstration patients). There were no differences, though, in the demonstration and non-demonstration patients' experience with out-of-pocket expenses, due, presumably, to the very deep supplemental coverage of all patients.

9.7.3 Physician Satisfaction with Patient Care

Physicians who referred to demonstration and non-demonstration hospitals also reported on how satisfied they were with the care provided. These results are reported in Table 9-18. More than 90 percent of the physicians said that they were very or most satisfied

Table 9-18

Physician Satisfaction with Patient Care

	Demo Hospital (n=65)	Non-Demo Hospital (n=40)
Overall quality	90%	97%
Technical sophistication	96%	97%
Skills of nurses	79%	69%
Ease of scheduling	72%	71%
Information on care of patients	70%	71%
Special programs	57%	62%
Programs for physicians	34%	37%

NOTE:
The percentages reported are those physicians indicating that they were "very" or "most" satisfied.
None of the differences between demonstration and non-demonstration hospitals are statistically significant.

SOURCE: Health Economics Research, Inc. analysis of Heart Bypass Demonstration Physician Surveys administered by the New England Research Institute.

with overall quality and technical sophistication of the hospitals, both with the demonstration and competitor hospitals. About two-thirds of the physicians were very satisfied with the ease of scheduling and information provided on their patients. Among both groups, fewer respondents were satisfied with special programs for patients or physicians that were offered by the hospitals. Of the physicians who referred to the demonstration and the non-demonstration hospitals, only 57 and 62 percent, respectively, were very or most satisfied with special programs offered to patients. An even smaller proportion, about 35 percent, were satisfied with physician programs. In general, there were no statistically significant differences in satisfaction among physicians who referred patients to demonstration versus competitor hospitals.

9.8 Conclusions and Policy Implications

Overall, there were no systematic differences in perceived health outcomes between the demonstration and non-demonstration patients. In a few instances the patients who were admitted to the demonstration hospitals did report to be in better health after surgery than those treated at competitor hospitals. For instance, demonstration patients had fewer readmissions for heart-related problems and a higher proportion of them reported improvement in ability to walk and garden. Thus, we can definitely conclude that the bundling of the payments did not have a negative impact on the health outcomes of the demonstration patients

Satisfaction with care received at the hospital chosen by patients was high among both groups of patients, but there is some evidence that the demonstration patients were more pleased with their experience. A significantly greater proportion of demonstration patients reported they were very satisfied with the overall skill of the nurses and reported that their length of stay at the hospital was appropriate. Demonstration patients also received fewer bills for their surgery and found the billing process to be easier than expected.

Most of the patients, though, did not know about the demonstration status of the hospitals, even among those patients who were admitted to one of the demonstration hospitals. In addition, only about two-thirds of the physicians had heard about the heart bypass demonstration. The demonstration hospitals had expected to increase the volume of surgery. As discussed in Chapter 4, the results were mixed with some of the demonstration hospitals succeeding in increasing patient volumes while others, in fact, experienced a reduction in surgery volume. It is possible that with knowledge of the demonstration, more patients would have chosen a demonstration hospital for their surgery, but this is unlikely since most physicians and patients responded that the demonstration status of the hospitals did not affect their choice. Other factors, such as physician admitting privileges, patient preference, hospital location, and emergency admissions appear to play a more important role in hospital choice.

Although not all hospitals were able to reduce costs by increasing patient volume, cost savings were achieved by reducing patient length of stay. The demonstration patients stayed significantly fewer days in the hospital than patients at competitor hospitals and yet

they reported similar or higher levels of satisfaction with care. This indicates that heart bypass surgery can be performed more efficiently, resulting in reduced cost without compromising patient satisfaction or quality of care provided. This finding is of particular importance in this era of rising health care costs and fiscal pressures to reduce Medicare payments.

10 Case Study of Changes In Patient Management

10.1 Introduction

Changes in patient management patterns were striking during the period of the Heart Bypass Center Demonstration. There is no question that these changes were heavily influenced by the financial incentives created by bundled payment. They cannot be solely attributed to the demonstration, however, in view of other profound changes that were occurring simultaneously in the organization and financing of medical care.

Three messages came through very clearly from our discussions with the staffs of demonstration hospitals. One was that awareness of the importance of costs was markedly stimulated. In some hospitals, this was a "wake-up call"; in others it reflected a heightened stimulus to previous initiatives. Practically all of the demonstration hospitals hired a consulting firm to help them identify opportunities to achieve cost efficiencies. This consultant, by presenting data from "leader" institutions, gave their clients the "courage" to make the changes needed to cut costs.

A second message was that the demonstration increased interactions between health professionals and administrative personnel. The perception of "being in the same boat" came through loud and clear. The degree of tension associated with these interactions varied from one hospital to another and, within each hospital, over time. Nonetheless, increased sharing and heightened sensitivity to the other's needs were common to all.

Third, and most important, was that patient outcomes remained the primary consideration despite efforts to control costs. Each practice change we observed was closely evaluated in terms of possibly deleterious effects on the patient, and only those that reflected no adverse effects or an improvement in care were adopted. Several changes in practice patterns ran counter to clinicians' "usual way" of treating patients and required wrenching changes in priorities or outlooks. Others required adjustments in the patient's expectations of the system (e.g., shorter stays). There was no evidence, however, that any of the changes we observed increased either patient morbidity or mortality.

The goal of this chapter is to summarize the major trends in practice patterns. Some hospitals were early and vigorous implementers of change; other were slower and more tentative. All hospitals ultimately changed, however, and the basic directions of change were common to all. Individual initiatives are highlighted to illustrate the range of responses.

10.2 Organization of Site Visits

Quantitative analyses of hospital and physician performance under the demonstration, presented in previous chapters, were supplemented by extensive on-site interviews with many managers and clinicians involved in bypass surgery. Interviews were conducted in several waves depending upon when the hospital entered the demonstration. The four original participants in Atlanta, Ann Arbor, Boston, and Columbus were visited 3 times, once briefly in mid-1991, followed by two in-depth visits in the spring of 1994, and spring-early summer of 1996. The three later participants in Houston, Indianapolis, and Portland were

interviewed twice, once briefly in the fall of 1993, and then in-depth in the fall of 1995. The schedule was designed to obtain a limited baseline on cardiac surgical services at the beginning of the hospital's participation and then, again, after roughly two and four years.

During each site visit, meetings were conducted with the following hospital personnel:

- CEO and Heart Institute Director (when applicable);
- Chief of Cardiothoracic Surgery and at least one other cardiac surgeon;
- Chief of Cardiology and the Director of the Cardiac Catheterization Laboratory;
- Chief anesthesiologist for cardiothoracic surgery;
- Director of the SICU;
- Intensivist on the SICU (if present);
- Head nurse on the cardiothoracic surgery floor;
- Clinical nurse specialists;
- Cardiac rehabilitation personnel;
- Cardiac social work service staff;
- Director of hospital quality management and utilization review;
- Individual responsible for data collection for the Heart Bypass Demonstration.

Questions to be addressed were sent in advance of the site visits, together with requests for written documentation of key data. The questions that guided our in-depth site visits are provided in Appendix E.

10.3 Organization of Cardiac Services

The seven hospitals differed widely in the size, organization, and complexity of their cardiac surgical programs. St. Joseph's Hospital in Atlanta, GA, and St. Luke's-Texas Heart Institute were at one extreme, and the two university hospitals, University Hospital in Boston, MA, and Ohio State University Medical Center in Columbus, OH, were at the other. At St. Joseph's Hospital in Atlanta, 18 cardiac surgeons in 5 different practices and about 100 cardiologists in 38 different practices provide services to patients with coronary artery disease. The interrelationships among physicians within each discipline were complex and central direction had to rely heavily on the director of the Heart Institute and hospital administration. Among physicians, one cardiac surgeon was the dynamic leader and active promoter of the demonstration. Anesthesiology included a team of 18 anesthesiologists who "did hearts" plus 11 CRNAs who were intimately involved in cardiac surgery cases. St. Luke's Hospital in Houston houses the Texas Heart Institute, which was founded in 1962. Eight cardiovascular surgeons are on staff, with a core of 50 cardiologists. The hospital supports a major cardiovascular teaching program with 18 fellows and 6 residents. All cardiovascular physicians at the hospital belong to a single practice group, Cardiovascular Care Providers (CVCP).

The two university hospitals were much smaller and were organized along more traditional academic medical center models. Responsibility for cardiothoracic surgery and cardiology were vested in full-time department chiefs. Arrangements with other surgeons and cardiologists varied but centered around salaried, full-time physicians. Neither hospital

used CRNAs in cardiac surgery. Each chief of cardiac surgery strongly influenced the hospital's participation to the demonstration and the subsequent changes in patient management. Both hospitals emphasized the importance of their training and research missions as complements to clinical care. The multiple roles of these hospitals created both opportunities and challenges to the implementation of change.

St. Joseph Mercy Hospital in Ann Arbor fell between these extremes. The formation of a Michigan Heart and Vascular Institute (MHVI) at St. Joseph Mercy Hospital early in 1994, illustrates the dramatic organizational changes that are occurring in health care institutions. The MHVI is a limited partnership owned by physicians that is located on the grounds of the medical center. It is funded by vascular and cardiothoracic surgeons and cardiologists and is currently led by cardiologists. Of these groups, cardiology clearly represents the outreach arm into a network of community facilities and practitioners. Patient education is a major goal. A chest pain evaluation unit is an important component that serves as an interface with the community and a triage center for patients with chest pain.

10.4 Hospital Admissions for Cardiac Surgery

A main trend we observed was far greater emphasis on same-day admissions for elective CABG surgery and, in a few hospitals, greater flexibility in accepting patients transfered from other hospitals for same day or weekend surgery. None of the hospitals performed same-day surgery on a regular basis at the time of our site visits in 1991. By 1994, same-day surgery was a routine part of practice in all hospitals except Ohio State

University Medical Center and St. Vincent's in Portland. The frequency of cases ranged widely from 0-4 per month in University Hospital to 80% of elective cases in St. Joseph's Hospital in Atlanta. Three-quarters of all DRG 107 patients at Methodist Hospital now are operated on the same day. In all cases, the patient visits the anesthesiologist and receives pre-admission testing the day before surgery and then comes to the hospital at 5 am the morning of surgery. St. Joseph Mercy Hospital initially experienced staff and physician resistance to the idea of same-day surgery. The rate of same-day admissions has grown rapidly since it was begun in FY 1993, however, and 91 patients received their operations on the day of admission during the first 9 months of FY 1994. Although St. Vincent's Hospital in Portland reported a greater proportion of DRG 107 vs. 106 patients than all other demonstration hospitals, the facility reported limited numbers of same-day surgery patients. Probably the most important reason was that 50 percent of open heart patients referred to St. Vincent's came from outside the Portland area. In general, overnight stays in all facilities were still the norm for patients traveling over 50 miles.

Most hospitals still limit CABG surgery on weekends to emergencies. Only St. Joseph's Hospital in Atlanta and St. Luke's in Houston have taken proactive steps to encourage weekend surgery. In Atlanta, transfers are accepted on Friday afternoon from referring hospitals and a full schedule for one surgical team has been established for Saturdays. This effort by tertiary centers to accommodate sources of referral is bound to increase as competition for cases heats up.

10.5 Pre-Operative Management

10.5.1 Patient Severity

Surgeons were generally unanimous that the mix of patients they were operating on were sicker than previously, although this had little to do with the demonstration. Patients are older, more prone to strokes, with a higher percentage undergoing a second or third bypass. More have symptomatic disease as well. Because of the expansion of angioplasty, supported by the growing use of stents, surgeons are seeing fewer one or two-vessel patients and disproportionately more left anterior descending (LAD) aorta patients which are riskier and not amenable to angioplasty. New technologies, however, such as TEE, transesophageal echocardiography, allows surgeons to operate successfully on sicker patients.

Offsetting this trend to an unknown extent, according to some surgeons and cardiologists, is the growing reluctance of surgeons to operate on especially high risk patients. Some surgeons are "a little more conservative now." New technologies, as well, support alternative therapies. For example, cardiologists might rehabilitate an old graft using thrombolysis instead of putting the patient through a high-risk redo operation.

A possibly interesting spillover effect of stenting is the growing inclination of some surgeons to take on high risk patients. One cardiologist felt this response was mandated by the declining surgical bypass volumes brought on by angioplasty. Also, stenting patients with previous bypass grafts was reported to be having an offsetting effect on the rising number of patients needing ongoing revascularization.

10.5.2 Unstable Angina and Acute Myocardial Infarction (DRG 106)

The medical and cardiology services play vital roles in non-elective CABG surgery, especially in patients with unstable angina or acute myocardial infarctions. In these patients, critical decisions involve, first, the decision to perform a cardiac catheterization and coronary angiogram and then the decision on whether medications, angioplasty, or CABG surgery is the appropriate treatment. Cardiologists are the gatekeepers and control both the time course of treatment and the treatment decision. The surgeon is often a consultant, though in many instances decisions represent a consensus between medical and surgical perspectives. Considerable efficiencies can be achieved if diagnostic and treatment decisions are timely and delays in scheduling of the catheterization laboratory or operating room are avoided. Hasty decision-making, on the other hand, may lead to unnecessary risks to patient welfare and inappropriate treatment decisions.

Unstable angina represented nearly half of clinical indications for CABG in the demonstration hospitals, and nearly a quarter of patients were operated upon after acute myocardial infarctions. The "handoff" of patients between cardiology and surgery provided a significant opportunity for reducing length of stay and, at the same time, created a point of tension. In a few hospitals, surgeons felt that cardiologists were too aggressive in pursuing angioplasty and were failing to refer patients who would have been better treated by surgery. An economic conflict of interest was mentioned, wherein aggressive cardiologists would refer to one another for angioplasty without first consulting the thoracic surgeon. When the angioplasty failed, the surgeon was required to work on vessels that had been dilated several

times making the surgery riskier. Surgeons said they would welcome a global payment arrangement that put cardiologists at risk for failed angioplasty as well. Some observers felt that surgeons were very concerned about the growing use of stents and what that might mean for their bypass volumes.

Delays by cardiologists in performing angiograms and, thereafter, in referring patients to surgery were bones of contention in two hospitals. In two others, cardiologists were concerned about delays in scheduling surgery. In one of these, the opening of a second dedicated cardiac surgery OR ameliorated this problem.

Transfers of patients with unstable angina from other hospitals create special challenges. Many of these patients have persistent angina despite maximal drug therapy and require prompt angiography and invasive therapy. The hospitals appeared to vary widely in their abilities to move quickly on such patients.

Aggressiveness of cardiologists in treating patients who had had recent myocardial infarctions also varied widely. Between 26% and 90% of such patients are being catheterized prior to discharge in different hospitals. Similarly, the threshold for catheterizing patients in the first few days after their myocardial infarctions varied considerably.

The pressures to shorten stays has had a direct effect on diagnostic catheterization in some facilities. Whereas formerly cardiologists might have waited until relatives can fly in to be with the patient before the diagnostic cath is performed, now physicians strongly encourage the patient to go ahead with the procedure.

10.5.3 Catherization Procedures

The major change in coronary angiography was in the choice of contrast media. In each case, cost was the driving force. One hospital reduced its use of the more expensive non-ionic media from 70% to 30% with consequent savings of $500,000 per year. Tradeoffs are increased risks of nepthrotoxicity and allergic reactions. Non-ionic agents are still preferred in all patients with elevated serum creatinines or a past history of untoward reactions to ionic agents.

Undoubtedly the most significant technological advance affecting the demonstration has been the use of stents during angioplasty. Inserting an expanding mesh tube into the occluded vessel prevents the opening from reoccluding—at least for a while. The stent can also be used to stop bleeding due to dissection of the vessel. One cardiologist believed that the emergency failure rate was reduced from 3 percent to 1 percent through the use of stents.

It was clear that some hospital cardiologists were more inclined to use stents. The range was from 20-50 percent of patients by demonstration hospital. But these percentages are misleading simply due to the time phasing of the interviews. The diffusion of stents, beginning some time in 1994, has been very rapid. Thus, the four original hospitals interviewed in 1994 had relatively low use rates; the three new sites in 1995 had somewhat higher rates; and the four reinterviewed sites reported higher rates, still, in 1996. Both cardiologists and surgeons were clear that stenting was cutting into the bypass volume to a significant degree, but only for one and two vessel occlusion.

Electrophysiologic procedures (EP) are growing rapidly in most of the hospitals, although one hospital was just initiating its program.

10.5.4 Angioplasty Standby Protocols

In 1991, the universal statement was that an operating room and surgical team were on standby for all angioplasties. By 1994, these protocols had been liberalized considerably, in part because of the high cost of a full standby and, in part, because of the low incidence of catastrophes. One hospital stated that it had had no emergencies after angioplasty in 2 years. Current policies take two complementary approaches. The more common practice is to have a surgical team on call. In this case, an OR is usually available within one hour. The alternative has been to reserve an OR only for high risk angioplasty patients (about 10% of all patients). The consensus is that the lower intensity approaches increase the efficiencies of catheterization laboratories, ORs, and surgeons alike with minimal downside added risks for the patient. Stents have greatly reduced the need for OR back-up as well.

10.6 Intra-Operative Management

10.6.1 Organization of the Surgical Team

Efforts have centered on increasing efficiency through the use of dedicated cardiothoracic surgical teams and the substitution of a physician assistant for a second surgeon. St. Joseph Mercy Hospital and St. Luke's Hospital were especially successful in implementing these staffing changes and, in the past 2 years, has achieved a reduction in the

time duration of 3-4 bypass graft operations from 4 hours to 3 hours and of CABG redos from 8 hours to 6 hours. Ohio State University Hospitals resisted similar changes because of the surgeons' dedication to teaching and the involvement of residents and fellows in cases.

OR turnover time received considerable attention, particularly in the nonacademic hospitals. OR managers have worked diligently to shorten the time that elapses from when the patient leaves the OR until the next patient's procedure actually begins. Turnover times of 30 minutes were reported to be achievable.

10.6.2 Choice of Medications

Considerable attention in the OR was focused on the choice of anesthetic agent and reducing the duration of its effects after completion of the operation. Some hospitals also made changes in the use of muscle relaxants, vasodilators, and prophylactic antibiotics, which are discussed in greater detail in Chapter 11.

The major issue in anesthesia has been the tradeoffs between continuing use of the brand name drug, Sufenta, or substituting the much less expensive generic drug, fentenyl. The former has the advantage of a shorter half-life and, hence, reduced duration of sedation after the operation. Its disadvantage is 6 times greater cost. Hospitals have responded in two different ways. A few hospitals were successful in encouraging their anesthesiologists to switch from Sufenta to fentenyl with dollar savings of from $100,000 to $250,000 annually. The longer half-life of fentenyl was dealt with by careful attention to reducing doses. The

other hospital resisted a change in agent but has achieved some economies by reducing doses of Sufenta.

Other changes in medications included using nitroglycerin as a vasodilator rather than the more expensive regitine and relying on generic rather than brand name muscle relaxants and prophylactic antibiotics. Eprotenein now being used extensively for redos and aortic arch aneurym cases. While effective, the drug can have severe side effects requiring close monitoring.

10.6.3 Standardization of Protocols and Supplies

Tradition has been for hospitals to give free reign to surgeons in their choices of surgical instruments, the content and use of surgical packages, in choosing valve prostheses or graft materials, and the types of volume expanders or cardioplegic solutions they use. Under the demonstration, the direction of change has been toward greater standardization of equipment, supplies, and OR protocols that reduce wastage of supplies such as surgical sutures and catheters. All vendors and ultimate purchase decisions are now routed through a single surgeon in a few of the hospitals. Operating room nurses also felt that the demonstration "gave us the clout" to bring other clinical areas like orthopedics into line regarding standardization.

Examples are provided by:

1. Standardization of cardioplegic solutions - one hospital reduced from 13 to a single type of solution but allows substitution of other solutions if the surgeon demands it. The end result has been considerable success in substituting Lactex ($6/bag) for Hespan ($50/bag).

2. Substitution of generic protamine for the brand name drug given to reverse the anticoagulative effects of heparin while the patient is on cardiopulmonary bypass. This substitution has been largely accepted in two hospitals without evidence of deleterious effects.

3. New Heparin-bonded circuits that create a protein layer in the tubing for the perfusion pump are being used, thereby reducing transfusions and the need to return to the operating room for bleeding, heart attacks, or pulmonary complications.

10.6.4 Intraoperative Monitoring

Sites differed regarding the intensity of intraoperative monitoring. At least one site uses Transesophageal Echocardiography (TEE) or Swanz-Ganz on all patients while another site tried to minimize their use in order to speed up the operative phase and avoid infections. TEE can be used to avoid strokes due to calcification of the right aorta. Anesthesiologists are rotating with cardiologists in using TEE during the operation. The demonstration seemed to have little effect on attitudes towards invasive monitoring equipment.

10.7 Post-Operative Management

10.7.1 Intensive Care

Probably the greatest management change in some of the hospitals was the increased involvement of the surgeons in the post-operative care, especially in the ICU. "Surgeons are staying more involved," noted one cardiologist, "working with the anesthesiologist on ventilation and quick recovery. No longer does the surgeon simply hand off the patient and let other specialists manage--and charge--for the post-operative care."

Now, the surgeons have their own nurses who track and manage patients in the ICUs. Surgeons are also making more ICU rounds during the day to talk with patients and make sure patients are progressing.

The main emphasis has been on shortening lengths of stay in the SICU by achieving earlier extubation of the patient after surgery. Where possible, extubation is now performed on the same day as surgery compared to the previous norm of the following morning. Lighter anesthesia, greater attention to warming the patient after hypothermic bypass, and low dose narcotics are key preconditions. The result in one hospital has been lower pneumonia rates due to the early extubation. Each hospital has approached earlier extubation cautiously by developing explicit weaning protocols and carefully monitoring outcomes. For example, one hospital started by limiting early extubation to patients less than 75 years of age with normal left ventricular ejection fractions and then gradually expandeding indications as its experience increased.

Prior to the demonstration, patients used to receive morphine and sleep the first 24 hours in the ICU. At present, hospitals report that from 10% to as high as 70% of patients can be extubated in the first 8 hours after surgery. At St. Joseph's Hospital in Atlanta, the mean time to extubation has fallen from 10-11 hours to 7-8 hours. Patients are mobilized much faster. They are up and sitting in a chair within 2-3 hours after extubation in the ICU. With close surgeon management, clinicians can deviate from the established critical pathways as the condition warrants, possibly transferring a patient to the routine floor at 10:30 a.m. instead of the end of the day or next morning.

Corresponding reductions in SICU lengths of stay have been impressive. For example, ICU stays have gone from a mean of 2.8 days in 1988-1990 to 1.5 days at present in St. Joseph Mercy Hospital. University Hospital reports that 70% of patients leave the SICU within 24 hours. Ohio State University Hospitals report that 25% of patients leave the SICU on the first post-operative day and 75% on the second port-operative day. At OSU, all patients have to be ambulatory before leaving the SICU, free of problems with arrhythmia, and be off intravenous drips. Other hospitals rely on step-down telemetry units to manage arrhythmias.

SICU staffing changes have also occurred. The anesthesiologist, surgeon, and nurse play the major roles. In general, the anesthesiologist is involved only during the first hour. A major change has been to substantially reduce the roles of the respiratory therapists and intensivists.

Another emphasis has been on reducing the frequency of blood gas and electrolyte determinations. For example, the frequency of blood gas determinations per case at OSU was reduced from 16 to 8 after a cost efficiency consultant found the hospital to be a high cost outlier. St. Joseph's, Atlanta, also reduced their lab and blood gas test frequency. They also dropped their routine EKGs post-operatively in favor of the next day. And they no longer repeat lab tests on DRG 107 patients that were already done elsewhere prior to admission.

One hospital used to give ICU patients Hespan, a large plasma volume expander. Now they have switched to a new product with less fluid overload.

10.7.2 Recuperation on the Floors

The most dramatic changes in post-SICU care are the use of critical pathways used to guide treatment, delegation of considerable responsibility for follow-up to clinician nurse specialists (CNS); and reduced use of medical consultants.

Formal Critical Pathways have been implemented in most hospitals. The development and implementation of Critical Pathways was described best by University Hospital. Here the effort was centered initially on cardiothoracic surgery and involved close collaboration between nurses and physicians. Nursing is credited with providing the "glue". A task force was formed in 1991-1992. Objectives were to define day-by-day post-operative treatment goals; implement these; analyze variances including reasons for deviations from targets; and adjust accordingly. Measures of success were defined in terms of patient morbidity, patient satisfaction, cost per case, physician and nurse relationships, and readmission rates. The consensus has been that implementation of critical pathways creates tension but has the very positive effect of encouraging the adoption of new and quicker ways of providing care.

The use of Critical Nurse Specialists (CNSs) varies from hospital to hospital. Extreme patterns are exemplified by OSU Hospitals, on the one hand, and by the St. Joseph Mercy Hospital and St. Joseph's Hospital in Atlanta, on the other. In OSU, two CNS's are consulted only on utilization outliers and report to Quality Assurance. Their objectives are to use Critical Pathways to control post-operative excesses in utilization. In St. Joseph Mercy and St. Joseph's Hospital of Atlanta, CNS's are paid by the hospital but work for

cardiothoracic surgery. They round daily on all patients, write orders, and act as case managers. Floor nurses, in turn, provide routine nursing care, do patient education, and maintain patient charts.

Reduced use of medical consultants was reported in practically all hospitals. In most, the cardiologist's role during surgery and follow-up has been virtually eliminated. At St. Joseph Mercy Hospital, consultants per case fell from 3.6 in 1991 to 2.6 in 1993. At St. Joseph's Hospital in Atlanta, hematology consults fell from 3% to 1.1% of cases between 1991 and 1993 and infectious disease consults from 5.1% to 2.8% of cases. Representatives from consultant specialties complained that they are now being called too late and that patients are much sicker than previously. We were not able to verify these comments.

A few hospitals have stopped monitoring for arrhythmias on the floors due to the high number of false positives. In one hospital, about 10 percent of patients with problems receive a cardiologist consult on the floors.

In managing patients, thoracic surgeons would agree that "reducing length of stay is not where the money is," at least not any more in more efficient hospitals. The savings must come in the operating room, the ICU, the cath lab, and in the surgeons' offices; these are the areas where physicians work and use expensive technologies and supplies. In the ICU, for example, longer ventilation requires expensive 1-on-1 nursing plus respiratory treatments, taking constant blood gases, blood drips, etc., that require a lot of disposables. Once a patient is extubated, all those spending "gears" stop and the patient can move on.

10.7.3 Discharge Planning

Pressures for earlier discharge require earlier attention to post-discharge planning, better coordination with family and community services, and, very importantly, adjustments of the patient's and family's expectations. Little hard data were available to support claims of success. In several hospitals, however, patient education is now begun at the time of the pre-admission visit, with an expectation of discharge 5 to 7 days post-operatively if the clinical course is uncomplicated.

At Boston University, discharge planners do assessments on all patients twice a week. This adds to cost but does catch rare complications among young healthy heart patients. Planners have targetted home health service needs early on in the stay to assure continuity of care.

At Methodist, 85% of patients are sent home after surgery; 5% go to rehabilitation facilities and 10% to Extended Care Facilities for physical therapy. Bypass patients have become more debilitated over time as they are older when they undergo the operation and have more redos. Of the 85% sent home, almost half receive home care services. Discharge planners use an over-71 age threshold in considering home care, finding age a more important criterion than whether a spouse is in the home. Over the last four years, the percent receiving home health services has doubled. The hospital feels it has good home health support in part because it uses its own internal agency. Methodist has eliminated its Social Work department in favor of department-specific responsibilities. One critical nurse specialist is devoted full time to the bypass demonstration and discharge planning needs.

This person not only works with bypass patients on the recuperative post-op floors, but also develops discharge plans and holds classes for patients and families.

A special home health problem encountered by discharge planners is the lack of outpatient drug coverage under Medicare. Patients are being sent home earlier with greater needs for expensive drugs. Planners are coping with this problem by trying to arrange for alternative sources of drugs at lower costs.

10.8 Quality Management

10.8.1 Cardiac Data Systems

The capabilities of cardiac registries varied widely both at the beginning of the demonstration in 1991 and in 1994. Of the four original participants, three hospitals had established cardiac surgical registries in 1991, but one of these served primarily research purposes. By 1994, databases in the two clinically-oriented sites were being used regularly to monitor outcomes, and significant progress has been noted in all sites during the demonstration.

A major shortcoming has been the failure to link cardiac catheterization laboratory databases to cardiac surgical databases. The result has been the need to reabstract catheterization, non-invasive testing, or EP data for inclusion in the surgical registry with consequent missing or inaccurate data. Two of the three additional sites now are linking clinical and micro-cost data to collect rigorous cost-effectiveness analyses.

Long-term follow-up data was collected routinely in only one hospital in 1991 and, then, it was unclear how these data were used to improve the quality of care.

10.8.2 Quality Management

Hospital-wide quality management systems ranged from non-existent to sophisticated (and expensive) continuous monitoring of as many as 20 clinical indicators. OSU Hospitals, in particular, had implemented a system that routinely monitors variables such as inpatient mortality, complication rates, readmission rates, and patient satisfaction and produces quarterly control charts. This system was unable to provide results directly applicable to cardiac surgery, however.

Monitoring of cardiac surgical outcomes within the department was especially impressive in two hospitals. In one, several studies had been completed examining such issues as reoperations for bleeding, use of blood products, and use of laboratory tests including blood gases. In another, monthly reports on upwards of 20 variables were generated and discussed at Mortality and Morbidity conferences. Boston University has emphasized producing a complete clinical data base on bypass patients within one week of discharge. This data base is expanded through patient follow-up to include data on post-discharge complications, medications, readmissions, sternal infections and what visiting nurse services patients are getting. Their system also collects functional status information.

As part of BU's quality assessment, the department conducts mortality analyses using the Society of Thoracic Surgeons' risk factors. The analysis is done on all bypass

patients and not just Medicare. The department also administers a special survey of over-75 patients with valve surgery.

Post-operative complications present difficult problems for QA managers. A significant number of patients have atrial fibrillation or diabetes complications. While the latest trend, they say, is to discharge atrial fibrillation patients quickly, BU keeps them another 24 hours. However, it is unrealistic in today's market to keep patients in the hospital 14 days for diabetes and other "routine" complications; hence, the greater need for post-discharge QA.

11 Case Study Findings: Improvements In Hospital Management

11.1 Introduction

Quantitative analysis of trends in patient outcomes, lengths of stay, and costs is necessary component of the evaluation of the demonstration. Equally important, however, is gaining a better understanding of the organizational and behavioral changes that underlie the numbers. A demonstration provides more than statistics; it also provides an opportunity to talk with providers about how they responded to the incentives embedded in a single bundled payment. Abstract statistics do not inform policy makers about how lengths of stay were shortened, only that they did fall, nor do statistics tell why costs were reduced in the pharmacy; only that they did. And while statistical analyses can correlate changes in key outcomes with the introduction of the novel global payment arrangement, they do not rule out other possible explanations that only the providers themselves are aware of.

In this chapter, case study findings regarding improvements in hospital-physician management are reported. Personal interviews with hospital managers, their staffs, and physicians were conducted to fill in the missing organizational information on what changes were made, to improve efficiency or why they were not made. Incentives to improve efficiency are fairly clear with a joint payment. First, both the hospital and physicians have incentives to improve the efficiency and reduce the costliness of care to stay within the negotiated global rates. These rates are absolutely fixed under the demonstration with no

additional outlier payments, capital passthroughs, etc., that exist in the current Medicare prospective payment system. The second, quite unique, aspect of the demonstration is the alignment of physician with hospital incentives to control costs. How have hospital staffs and physicians responded to the shared incentive to improve efficiency? What evidence is there of a closer working relationship in managing source and costly inpatient resources? Which services have been most amenable to management improvements? Answers to these questions form the basis of this chapter.

11.2 Organization of Interviews

Several hospital managers, key department staff, and physicians were interviewed in each of the four original demonstration hospitals regarding management improvements. Persons interviewed included:

- Chief Financial Officers
- Comptrollers and financial analysts
- Vice-presidents responsible for clinical and institutional care
- Programmers responsible for cost accounting
- Department managers of the ICU, nursing service, operating room, catheter lab, and pharmacy
- Clinical nurse specialists responsible for monitoring demonstration patients
- Thoracic surgeons
- Anesthesiologists, cardiologists, and consulting physicians.

The interviews took place over a two-day period in the Spring of 1994 and again 18 months later, over thirty months after the hospital and physicians began receiving single bundled payments. This allowed time for the providers to respond to the incentives under a single payment and to implement management changes designed to improve efficiency.

Interview protocols were tailored to the responsibilities of the interviewee. (See Appendix E.) Broader financial questions on gains and losses were directed to CFOs, comptrollers, and others responsible for setting and managing hospital budgets. Other questions were asked of department heads concerning management efficiencies introduced over the last three years. Clinical staff were asked to describe ways in which patient management had changed that would have implications for costs.

The results reported below reflect the synthesis of all the comments and observations from the more than 100 interviews that touched upon management issues in one way or another. The findings in this chapter are presented in six parts. Systems used in monitoring patient costs and severity of illness are presented first, followed by a discussion of management improvements in the ICU, on the routine nursing floors, in the operating room, in the catheter lab, and in the pharmacy. Although many other departments are called upon to provide services to bypass patients, such as radiology and pulmonology, their role is more tangential with much lower contributions to patient costliness on average (see Chapter 6). Respondents did comment on the use of ancillary services, on the other hand, and their observations are reflected where they apply.

11.3 Systems for Monitoring Costs and Outcomes

Two kinds of data are routinely collected by providers on bypass patients: (1) clinical registry information on patient risk indicators and health outcomes; and (2) micro-cost data on resource use and costs. Clinical data come from both physician and hospital medical records. Few other specialties collect as much detail on their patients as cardiovascular surgeons and cardiologists. Micro-cost data, by contrast, are collected by the hospital finance department for all hospitalized patients. Not only are these data quite detailed, they are available on all patients and not just those with heart disease. For evaluation purposes, their primary limitation is the lack of information on physician inputs beyond the reporting of tests and procedures. These micro-cost systems cover only the costs incurred by the institution, excluding physician practices. Fortunately, having a comprehensive listing of physician-related tests and procedures allows one to track the bulk of physician activities as well.

Of the two data systems, this chapter concentrates on the micro-cost information used by hospitals in evaluating management changes. How was it developed? How has its use changed under the demonstration? The role of the clinical data set is discussed in Chapter 10 on patient care management.

11.3.1 Implementing a Micro-Cost System

First, what is included in a micro-cost data set? Most researchers are familiar with the Medicare cost reports. These reports summarize direct labor and other costs at the

department level and stepdown indirect overhead costs into departments using appropriate statistical bases, e.g., department square feet, salaries. Medicare cost reports do not report counts of tests, procedures, or other intermediate outputs within departments, unfortunately, except for nursing where patient days are given. Nor do they directly link costs and resource use to specific patients. Micro-cost data sets do report department volumes and individual patient costs. Three of the four original demonstration hospitals have adopted extremely disaggregated micro-cost accounting software that itemizes and costs every service appearing separately on a patient's bill. The fourth hospital uses a less complex costing software that, by their own admission, is less refined but considered adequate for management purposes.

Appendix F gives an example of the level of detail available for these bypass patients. Ten different categories of costs are shown for literally hundreds of different services and drugs, including:

- 4 hours (O.R.) = $449.38
- Swan-Ganz catheter = $70.29
- 4 Chem 20's = $96.34
- 2 Monitor CO2/OXI = $56.24
- 1 STAT EKG = $29.20
- 2 units of IV Heparin 100 = $10.58
- One left heart cath = $254.64
- 8 ICU-East room care days = $1,774.54
- 6 Routine Telemetry days = $649.24 + $146.07

How are these micro-cost systems implemented? Initial calibration and implementation requires extensive hospital resources after purchasing the software. One respondent estimated that upwards of $500,000 could be spent implementing the system over 3-4 years. Initial cost and timeliness are two strong arguments against adopting a

full-fledged micro-cost system and certainly put it out of the reach of even middle-sized institutions, unless significantly streamlined. On the other hand, if the system saves only 1% in annual costs, it could pay for itself in the first year in a $50 million institution.

Initial calibration is the most costly and time-consuming. Each department manager is asked to identify the services that comprise, say, 80% of charges. This can be 5 or 50, depending on department. Next, managers and staff are asked to list all of the inputs involved in a test or procedure. For example, one hour in the operating room (code 6000015) has inputs divided into 6.7 professional labor hours at $10.86 average wage per hour, total cost = $61.58, plus nonsalary supplies that include: 1 exam glove ($0.81), 1 sponge count bag ($0.61), 2 suctions ($2.46), 3 syringes ($0.27), 1 bandage roll ($0.09). Total nonsalary expenses = $4.24, which, when added to salary costs, gives $65.82 in procedure costs. This estimate does not include the perfusionist (estimated to cost $619.73 in professional time, cardioplegic solutions, pump tubing, etc.). Nor does it include extra cart supplies required in open heart surgery.

Once each labor and nonlabor input is identified, managers next estimate the labor time and quantities of inputs that go into producing a specific test or procedure. Then, the accounting department applies a unit cost to the average input quantities to derive an estimate of total direct cost for the service. Calibration is eventually done for thousands of services involving hundreds of different inputs. Also as part of calibration, managers must classify each input as variable or fixed. Often, this requires a proration of the input into a fixed and variable component, e.g., floor nurse variable time on a floor vs. head nurse fixed time. The

same is done with indirect costs such as dietary, administration, housekeeping, and buildings and equipment, each of which has fixed and variable components. Dividing indirect costs into fixed and variable is a break with past accounting methods that simply treated all indirect costs as fixed; an assumption clearly inappropriate for dietary, housekeeping, and other census related support services. It should be noted that the demonstration hospitals differ widely in their fixed-variable allocation algorithms, and interhospital cost comparisons must be made cautiously. At Methodist, the micro-cost manager noted the art of defining variable costs, asking the question: "Does the service vary with patient volume?" This is a simple question with a complex answer. For example, the hospital treated medical records as a fixed overhead cost; yet, more discharges means more medical records. St. Joseph's in Atlanta generally assigned a variable portion to all overhead departments including admissions and medical records. To what extent can the medical records department handle more records without increasing staff? A certain volume threshold must be applied which is unknown.

11.3.2 Micro-Cost Versus Cost-Based Accounting Systems

Micro-cost systems were designed to replace traditional cost accounting systems supporting cost-based reimbursement. The latter used crude cost-to-charge ratios to allocate costs to payers based on total charges in each department. Cost-based systems were very misleading regarding true patient costs. First, allocation algorithms could be manipulated in ways to maximize reimbursement that had little to do with real department costs. Second,

they never linked costs with individual patients. Payers simply wanted to pay their fair share of overall facility costs for their own patients taken as a group, not for individual patients. Hospital managers became interested in individual patient costing when Medicare prospective payment began paying flat rates on patients within DRGs. This required new, more patient-oriented, allocation systems. Medicare also required a more meaningful distinction between fixed and variable costs. Payments may not cover average total costs per discharge, but managers knew that was not the relevant cost in the short run. Average variable cost was more meaningful. Did a particular patient or product line more than cover its variable costs and contribute towards the fixed costs? If marginal costs were not even covered, then a patient or a whole DRG lowered short-run profits and threatened financial viability.

Micro-cost systems dealt explicitly with both problems by itemizing costs at the micro-service level, classifying costs into fixed and variable, and then linking them with individual patients through the patient billing system. Unbilled indirect services were also classified as to fixed vs. variable and allocated to departments and individual services in various ways.

11.3.3 Using a Micro-Cost System

With this brief overview of micro-cost systems and how they were implemented, what can be said regarding their use in the demonstration hospitals? Based on our interviews, it appears that hospital staff produce few standard micro-cost reports, nor is there

a single group that analyzes them. A flexible report writer built into the software allows managers of the data base to respond to requests from department managers. A special run will be given anesthesia, for example, on the frequency and costs of anesthetic agents, or to nursing on ICU lengths of stay, or to the OR Director on operating room times and supplies. The extent of decentralization and lack of overall direction in the use of the micro-cost data, while unexpected, is probably more effective than a single set of reports so long as delegation of responsibility for controlling costs is clear.

What has been the participants' experience with these systems? Micro-cost reports can be used at two very distinct levels in the hospital. At the CFO level, micro-cost reports track costs, reimbursements, and profitability for demonstration DRG's 106 and 107 taken as whole. It was surprising how little attention in general has been given to such reports. None of the hospital CFO's spent much time monitoring monthly or quarterly financial reports on profits and losses on demonstration patients. Partly, this was due to the lack of an accurate cost accounting as three of the original four hospitals either did not have or were just implementing a micro-cost system when the demonstration started. But even in the hospital that already had an operational micro-cost system, review of financial performance was done only annually. Financial managers either do not view monthly reports as representative of longer-run trends due to random variation in patient requirements or that such reports have no immediate management implications beyond targeting a DRG (or department) for detailed analysis. In their annual reviews, however, financial officers did compare actual costs with negotiated payment rates under the demonstration to see how the

hospital was doing financially and what the expected gain or loss might be next year with the payment updates.

Early on in the demonstration, managers realized that micro-cost systems alone were inadequate in helping them understand and change physician practice patterns. The strength of these systems, they realized, was not in the "costs" they generated so much as in the resource use statistics underlying costs, e.g., echocardiographs, stress tests, vials of ionic vs. non-ionic contrasts, operating room hours. While some efforts have been made to reduce cost per unit of service, managers realized that the level and mix of services was driving cost differences across patients and over time. They also quickly realized the value of presenting the micro-cost data in a particular way to clinicians who managed patients. First, and most important, they discovered that information on resource use must be patient-specific and capable of being sorted by surgeon. It also must be available in extremely itemized form. The one hospital that did not have a micro-cost system but relied on outdated cost-to-charge methods encountered strong resistance from surgeons who felt they could not respond to "high pharmacy costs" in general without knowing the procedure bundle, to cite one department. The micro-cost manager at Methodist noted the challenges of unbundling services in enough detail to assist in managing patients. One problem even with the best systems is the “last 20%” of services that are not micro-costed but simply costed using old cost-to-charge ratios. To change physician practices, clinicians must be shown exactly which drugs they are using, how many ICU days their patients are incurring, how many suture

packets or catheters they are using, all compared to their peers. To tell surgeons that their DRG 106 patients are 15% more costly than their peers is less than helpful; it is antagonistic.

Even with the fine-grained procedure detail, micro-cost systems, by themselves, proved inadequate in convincing physicians to change their practice patterns. When questioned, physicians claimed that their patient mix was different and required more services. Nurses made similar claims about patients admitted to the ICU and routine floors. Similar responses stymied managers in most U.S. hospitals after the first few years of Medicare prospective payment when unnecessary days had been squeezed out and the tough job of reducing intermediate services began. To address the "unique patient mix" argument, all four of the original hospitals contracted with L. Byrne Associates to produce a set of comparative reports on the two demonstration DRGs separately (see Exhibit 11-1). These reports had several strengths: They

(1) provided comparative information on similar hospitals and for the same hospital over quarters;

(2) provided key descriptive patient indicators such as age, percent of patients with at least 3 comorbid conditions, percent with acute AMI, etc.;

(3) provided comparative information on patients organized by surgeon; and they

(4) decomposed costs in more meaningful clinical ways such as length of stay from admission to cath and cath to bypass, etc.

Hospital financial managers did not have the expertise to organize and present their micro-cost information in a way convincing to physicians, but they were wise enough to

contract with a group who did. Hospital managers also upgraded their nurse acuity systems and included them in their micro-costing data bases to better evaluate per diem nursing utilization.

A final strength of the "outside contracting" approach was that it kept financial managers at arms length in the discussion of patient management. L. Byrne clinical staff would meet quarterly with physicians to review the data and discuss possible efficiency improvements. In these discussions, consulting staff relied on their experiences in similar institutions. What peers were doing elsewhere carried considerable weight with demonstration physicians. Comparative reports would not have been possible, however, without the micro-costing system and its itemized format linked to patients.

The micro-cost information along with key patient characteristics were used in several important ways to reduce the costs of bypass surgery. Probably most significant was the decomposition of length of stay into four parts (for DRG 106): (1) admission to catheterization (angiography); (2) catheterization to surgery; (3) post-surgery ICU days; and (4) post-ICU routine nursing days. Each segment involves a different set of diagnostic and therapeutic decisions, a different set of physicians, and a different locus of care within the institution. By breaking down the stay into more clinically meaningful parts, managers and physicians were able to work with the appropriate decision makers in reducing lengths of stay.

Although the outside contractor put the micro-cost data in a form useful in evaluating physician practice patterns, none of the four original hospitals ever actually merged it with

their clinical data. (St. Vincent's Hospital in Portland has begun merging their micro-cost and clinical data sets.) Each surgical group maintains a detailed clinical data base on risk factors, anatomy of disease, complications, procedures, and outcomes. Were these data merged with information on resource use, hospital managers and physicians could gain a deeper understanding of the factors explaining the variation in costs across patients. Very few risk factors, for example, are displayed in the L. Byrne reports, nor are patients stratified by risk factor and costs and utilization displayed. ICU days per patient may be longer for some surgeons because more of their patients were undergoing their second bypass, or were over 75 years old, or were admitted as emergencies. Each of these factors, we have found, increases lengths of stay (see Chapter 7). Also stratifying lengths of stay and resource use by type of complication would document the cost implications of reducing complication rates.

Nearly all hospital and physician respondents felt that the single bundled payment was critical in encouraging more detailed, accurate, cost reporting so necessary in changing physician practice patterns. Indeed, once a couple of hospitals negotiated bundled discounted rates with HCFA, they accelerated implementation of a micro-cost system. In another instance, when hoped-for volume increases didn't materialize in the demonstration's first year, producing large financial losses, the hospital started to upgrade their costing system and brought in an outside evaluator.

Managers acknowledged that, for the first time, physicians--and surgeons in particular--took an active interest in hospital resource use. In discussions with their peers

and with L. Byrne staff, surgeons began reviewing micro-cost printouts and questioning excessively long ICU stays, the use of very expensive non-ionic contrast agents in catheterization, nonstandard surgical supplies, delays between angiography results and surgery, the use of expensive anesthetic agents, and above all, the use of physician consultants. In most hospitals, physicians were said to be very cooperative in reviewing micro-cost reports and L. Byrne data. Without doubt, having the head surgeon actively involved in reviewing practice patterns and the costs in the operating room, the ICU, and the cath lab, changed the decision-making dynamic. Surgeons are far more effective than untrained hospital financial managers in encouraging their peers to adopt more cost-effectiveness methods. Not only are they intimately familiar with patient needs and true differences in severity, but they become the ultimate decision maker in a patient's care once he/she is scheduled for a bypass. Hospital administrators, in contrast, exert far less leverage over physicians, especially in academic medical centers (which comprised two of the four participants).

Another shift in the decision-making dynamic came from the availability of comparative data. Many surgeons and cardiologists were challenged by their peers in other institutions to become more efficient, to shorten stays, to reduce pharmacy costs, etc. Each quarter, clinicians saw a new "report card" on their performance relative to their peers in similar hospitals. These comparisons built upon the academic aspects of the demonstration just as new findings from clinical trials challenge physicians to practice in different ways. A direct outcome of this challenge was the willingness of most surgeons to support the

development of clinical pathways protocols that streamlined patient flow through. (See below for more discussion.)

A fourth hospital was not nearly as successful in changing physician practice patterns primarily because its surgeons have regarded the micro-cost comparisons as an intrusion on their practice. Historically, physicians have been resentful of financial managers telling them how to practice medicine. They are accustomed to having full authority over hospital resource use without any financial responsibility for costs. Although most demonstration hospitals enjoyed a close working relationship with physicians, in the one site where surgeons resisted the concept of comparative costing, the impact of micro-cost reporting on streamlining care was greatly diminished. Claims were made that a surgeon "couldn't use albumin to resuscitate patients" or there were pressures "to reduce suture costs". It was not possible to corroborate such claims, but they typify the thinking of some clinicians when faced with intrusions on their decision-making domain. Resistance to changing practice patterns will remain the single greatest barrier to reducing bypass surgery costs under a natural global payment program. What forces might explain the degree of resistance to change will be discussed in Chapter 13 on hospital-physician relations.

Besides the obvious advantages of the micro-cost system in better managing patients, hospitals are using it to set more efficient department budgets as well. In the past, managers have lacked detailed information on the range and costliness of outputs at the department level, e.g., two-view chest x-rays, head CTs, MRIs. With the micro-cost system, not only are actual volumes tracked by individual service, they are weighted by resource use.

Furthermore, variable costs are distinguished from fixed costs. This allows managers to set prospective budgets based on expected changes, not in overall patient volumes, but department-specific volumes adjusted for both procedure mix and variable costs.

St. Vincent's Hospital in Portland is using their micro-cost system to monitor lengths of stay in the operating room as well. They have also begun linking clinical data to the micro-cost data in order to make more meaningful comparisons to show their physicians. They are using these linked files to study the rising costs of antibiotics. Micro-cost data are key because physicians are aware of the huge markups on costs and don't trust charges, alone. St. Luke's in Houston is using the system in a similar vein to determine the cost and outcomes to infections by type of patient. By linking costs with infections, hospital management is working with physicians to reduce infection rates as a cost-reducing preventative intervention.

Most other hospitals have been slow to link clinical and micro-cost data, and some reported a definite bias against such efforts. Part of the reason involves the complicated nature of the merging of clinical and micro-cost data. It would appear that demonstration hospitals were at various points in the evolution of their micro-cost and clinical data systems. Some, like OSU and Methodist in Indianapolis, used the micro-cost data simply to track financial performance and general physician profiling under the demonstration while most of the rest had moved beyond the "did we lose money?" stage to using the systems to monitor individual kinds of patients more efficiently. This is understandable given the enormity of the data files and the analytic input required to merge and use the systems to convince

physicians to change practice patterns. At St. Luke's in Houston, financial and outcomes data are linked with quantitative goals set each year. Cost effectiveness studies are presented to the CEO and CFO each year.

11.3.4 Micro-cost Systems and Managed Care

Micro-cost systems are more and more being used by hospitals in their private managed care contracting. All the participants used them for this purpose. Indeed, probably the strongest emphasis for upgrading the system at OSU Hospitals was the need to provide detailed costing information to private HMOs. St. Vincent's in Portland uses their micro-cost system to submit bids to Kaiser and in responding to Aetna's requests for bids. Having experience in using the systems, analytically, under the bypass demonstration has impressed private insurers. The old cost-to-charge systems were very confusing to managed care plans who did not trust them. The demonstration provided the impetus to refining and using the micro-cost systems creatively in managing patient care more efficiently.

The detail on the system allows them to submit bids on either DRGs or ICD9 codes, which are not always the same. At Methodist and elsewhere, the hospital is using the micro-cost data to generate per case estimates for DRGs 104-108 and 112 specifically for the private managed care population in question.

A serious limitation of all the micro-cost systems for managed care bidding is the lack of data on physician and post-discharge services, two major cost areas of interest to managed care plans.

11.4 Overall Staffing Changes

Two of the four original demonstration hospitals emphasized their conscious plan to reduce staffing levels. St. Luke's also reduced staffing in response to volume declines. At one facility, full-time-equivalent staff had been reduced by 200 (10-15% of workforce) in the last two years. In the second hospital, the workforce had been reduced by 500 or more FTEs over four years while total hours per adjusted discharge fell from 210 to 165.

Both hospitals used data from other hospitals to evaluate their own staffing levels. FTE target levels were set by area to hold management accountable. It should be remembered that this was also a time of declining inpatient use across the country, accompanied by the spread of managed care and cost cutting pressures. Both hospitals used attrition as a primary way of reducing staff, especially in the nursing area. Both hospitals also focused on the overhead areas in an attempt to reduce top heavy management. One was much more aggressive, however, in eliminating an entire layer of assistant vice-presidents in charge of groups of departments.

11.5 Intensive Care Units

11.5.1 Shorter Stays

Based on interviews with ICU nurses and hospital managers, it appears that the demonstration has led to significant gains in efficiency in post-surgical ICU care. At the beginning of the demonstration in mid-1991, 48-hour ICU stays for uncomplicated patients was the standard protocol. Just two and a half years later, 24 hours is the expected stay for

uncomplicated patients. In one hospital, 70-80% of patients were discharged from the ICU within 24 hours as part of an overall stay plan of just 7 days.

Key to shorter ICU stays is early extubation. Protocols in one hospital called for extubation within 8 hours of surgery, accomplished by close monitoring of "drips", bleeding, and other signs of complications. Nevertheless, a few anesthesiologists in two of the hospitals were reluctant to take out tubes until the second ICU day. In most cases, though, physicians seem willing, even anxious, to shorten ICU stays. Some felt that even 24 hours was unnecessary for very simple cases.

One hospital, however, continued to have troubles implementing its ICU protocol with only 25% of patients discharged in 24 hours. Problems occurred in weaning patients from their anesthetic lines due to shivering and occasional seizures. At first, physicians simply aborted the protocol instead of monitoring patient vital signs and continuing weaning. This led to a new protocol for weaning patients. Nurse specialists worked with anesthesiologists to begin warming patients sooner in the operating room to avoid complications that delayed extubation and prevented quicker ICU discharges.

Another key to short ICU stays is early ambulation. Nurses chart the number of feet a patient walks each day and their oxygen intake levels to assure they are ready for the routine nursing ward.

Three of four original hospitals adopted some form of clinical pathways implemented by clinical nurse specialists to improve patient flow-through in the ICU as well as elsewhere. ICU staff felt having a single person familiar with the patient throughout their

stay helped in making difficult decisions about early transfer to a stepdown unit (see Chapter 10 for more details).

Residents in academic medical centers present special problems in shortening ICU stays. They are less experienced, nurses claim, and tend to overdo testing. Their inexperience also makes them very conservative in discharging to the routine nursing floors. Still, the demonstration and the introduction of nurse specialists has forced all staff, residents included, to rethink standing orders regarding how frequently to draw blood, to do blood gases, etc. Using, L. Byrne data, one hospital was shown to be an extreme outlier in the number of times during an admission blood gases were evaluated. New protocols cut the frequency in half from 16 to 8.

11.5.2 Economies of Scope

Yet another reason for a less costly, more efficient, ICU stay for bypass patients has to do with the concentration of heart patients. One hospital in the demonstration has two critical care ICUs with 51 beds and three med-surg ICUs, all devoted to heart patients; this, in a 300-bed hospital. Focusing on such high acuity patients accomplishes several goals. First, the hospital can support several dedicated heart surgery teams, each of which sees large numbers of patients annually. Second, the hospitals are able to purchase ICU heart supplies in bulk. Third, in making heart care its top priority, the hospital is willing to devote considerable resources to the success of the heart program, including adding new ICU beds, introducing protocols to improve efficiency, and constantly seeking new heart business.

Fourth, by having such a high patient acuity, the cardiac ICUs can attract the most qualified critical care nurses in the city. Fifth, a large heart ICU caseload allows for more staggered nurse staffing, with a few nurses arriving at 7 a.m. and more brought on at 11 a.m. when morning surgery is over. Smaller caseloads at other institutions will not support as much flexible staffing. Nor are nurses as experienced in caring for bypass patients post-operatively. And sixth, with so many heart cases per year, management can standardize treatment patterns and supplies because the return is worth the investment. By contrast, hospitals that devote only a small portion of ICU care to heart patients often lack the ability to expand bypass volumes and face resistance from many other specialists demanding ICU support.

11.6 Routine Nurse Staffing

All four hospitals in the original demonstration felt they had made significant progress in reducing nurse staffing in caring for heart patients. The general decline in inpatient activity hospital-wide has reduced the demand for nurses. This is true even for coronary disease patients requiring complex, invasive, bypass surgery.

11.6.1 Critical Care Pathways

Probably the most significant, and obvious, change in routine nursing support for bypass patients has come about through the development of critical care pathways. Faced with incentives from the demonstration (and managed care more generally), demonstration

hospitals have implemented detailed protocols to manage bypass patients during their stay. Exhibit 11-2 gives one example of a critical path protocol. Specifying the decisions to be made by a given point in a patient's stay avoids bottlenecks and untracked cases that become expensive outliers. Clinical nurse specialists monitor each bypass patient daily in the cath lab, the OR, in the ICU, and finally, in routine nursing. Not only do they monitor patient progress and encourage quicker discharging to other units within the hospital, they also study long-stay patients to identify factors that cause excessive stays.

The pathways are divided into discrete periods of a patient's hospitalization: admission to cath, cath to surgery, ICU, and routine nursing. Consider, first, the time from admission to catheterization and then to surgery for DRG 106 patients having their angiography done in the demonstration hospital. The hand-off between the cardiologist and the surgeon often is a weak link in shortening DRG 106 stays. Cardiologists often spend considerable time deciding what kind of therapy is most appropriate, drugs, angioplasty, or bypass. The pathways encourage a quicker decision to perform angioplasty or go directly to bypass surgery. For instance, one demonstration hospital is set up to operate on Friday night or on the weekend, if necessary in order to minimize the delay between angiography and surgery. The other demonstration hospitals are not as aggressive in taking patients "at the last minute".

For DRG 107 patients, most hospitals have aggressively implemented same-day surgery protocols, thereby saving a day of routine nursing. All patients within a geographic radius (usually 50-100 miles) are targeted candidates for same-day surgery. Testing and

patient clinical interviews are conducted the day before in the physician's office adjoining with the hospital. Patients arrive at 5:30 a.m. the day of surgery and are prepared for the operation, having stayed at home or in a local hotel. To give some idea of the scope of the program, one hospital did same-day bypasses on 63 patients in 1993, and on 91 patients partway through 1994.

The movement towards same-day surgery admissions, it should be noted, is not solely due to the demonstration. Blue Cross in Michigan, for example, was denying extra days at St. Joseph's Mercy Hospital in Ann Arbor. In response, the hospital adopted a same-day surgery policy hospital-wide. Everyone agreed, however, that the incentives to shorten stays under the demonstration made surgeons and anesthesiologists more cooperative when it came to extending the concept to bypass patients.

11.6.2 Other Factors in Shortening Stays

Other key factors in shortening stays and saving on nursing inputs noted by participants included (a) changing patient mindsets about how long they should be in the hospital, (b) avoiding over-monitoring, (c) ambulating as soon as possible, and (d) picking up arrhythmias early and changing drug regimens. No patient likes to feel she is being rushed out of the hospital--especially if they feel they have paid for a longer stay through their health premiums. The challenge of nurse specialists is to change patient, family, and even physician expectations that a bypass stay is no longer routinely 15 days or more. Hospital staff have done this by updating the information pamphlet given bypass patients to

give a more accurate expected stay--often 8 days without complications. Some hospitals have produced videos to help patients understand their discharge rehabilitation regimen and the course of convalescence. Patients must recognize that some pain after discharge is normal. They must also be able to distinguish benign pain from true warning signs. All hospitals use home health nurses to follow up particularly serious cases that need home support. Respondents said it was equally as important to change surgeons' mindsets as well. The demonstration was particularly helpful, some nurses said, in getting surgeons to accept the new protocols and save on nurse resources. Although both patients and physicians are inconvenienced by same-day surgical admissions and shorter post-operative stays, both are seeing the benefits of as short a stay as possible.

Over-monitoring, especially resulting from taking blood gases too often or keeping patients on 24-hour telemetry on routine floors, produces many false positives that prolong stays. One hospital has avoided using routine telemetry or all bypass patients because of the high false positive rate. On the other hand, nurses noted that arrhythmias must be identified early so that drug changes can be made. If not, they can add several unnecessary days to a patient's stay. In general, patients are weaned off vasoactives and do not continue with "drips" on the routine floors, but some will still be on antiarrythmics to control heart beat.

Ambulation is now considered key to shortening stays, and nurses in the ICU and on the floors have quantitative goals regarding extent of walking and exercising.

11.6.3 Resistance by Non-Demonstration Specialists

Nurses and managers also spoke about the continued resistance to critical pathways in other areas of the hospital, such as orthopedics. Even floor nurses sometimes resent the nurse specialists intruding on their domain. There is little doubt that paying a single combined payment has brought the surgeon, anesthesiologist, and cardiologist over to the hospital's side in accelerating patient flow through. Private managed care could do the same thing, but until other specialists come under the same global incentives to conserve on scarce hospital resources, they appear unwilling to change their practice patterns.

11.7 Pharmacy

Based on interviews with hospital pharmacy directors, the demonstration has resulted in considerable cost savings. Drugs for heart patients can be divided into six categories: (1) cardioplegic solutions used during surgery; (2) anesthetics used during surgery or catheterization; (3) vasopressors used to restrict blood flow in the arteries; (4) anti-coagulants and diuretics to thin blood flow and eliminate excess fluids; (5) anti-infection drugs; and (6) medical therapy drugs. Incentives to reduce costs embedded in the single payment have encouraged surgeons, anesthesiologists, cardiologists, and other specialists to review their drug formularies and make cost-saving substitutions.

11.7.1 Cardioplegic Solutions and Plasma Expanders

Consider, first, changes in cardioplegic solutions. Hespan is a brand name cardioplegic pooled blood solution used intraoperative to expand blood plasma. It is put into the veins to retard large molecules from escaping and results in fewer blood products being used. One pharmacist reported that Hespan costs $50 per bag versus $6 per bag for a close substitute, Lactex. Over the 1992-3 period, one demonstration hospital reduced its use of Hespan from 189 units per month to just 40 units. Monthly Hespan usage was costing the hospital $6,522 in July of 1992, compared with $1,380 in December of 1993. Between 1992 and 1993, the hospital estimated it saved $47,554 in Hespan costs alone as outlays fell 62%.

It is interesting that at the one hospital where physicians tended to resist drug substitutions, the less expensive albumin was used instead of Hespan in the operating room. This may be explained by the differing attitudes of specialists towards brand and generic drugs in the same institution. In their operating room domain, surgeons may be quite willing to use less expensive products while the opposite may be the case for, say, anesthesiologists, or for cardiologists. One positive accomplishment of St. Luke's Collaborative Practice Team that includes pharmacists is the reduction in the use of expensive albumin, which was the single largest pharmacy cost item in the hospital ($1.2 million per year). When the federal government bought up much of the albumin in preparation for the Gulf War, the price to hospitals skyrocketed. HIV patients have also driven up use and demand. Now, the hospital is substituting hetastarch at $30 that replaces albumin bottles at $50-60.

11.7.2 Anesthetic Agents

Significant savings have also been achieved in anesthetic agents. The generic drug, fentanyl, is a preferred narcotic agent for open heart surgery. Many hospitals, including some of the demonstration facilities, had switched to the brand drug, Sufenta, at six times the cost of the generic drug. When one demonstration hospital began substituting the generic anesthetic in early 1993, it was spending roughly $15,000 a month on the two narcotics. By December, the monthly outlay had fallen to $1,000. The overall comparison of 1992 with 1993 showed a savings of $108,123, a 70% reduction. The pharmacy department conducted performance studies for the anesthesiologists and found that the generic, fentanyl, caused less rebleeding and had shorter ventilation times compared to the expensive brand drug. Shorter ventilation times also helped shorten ICU stays as an added savings. Another demonstration hospital reported a reduction of $107,590 by substituting the generic for the brand narcotic over the same two-year period. Another hospital is trying to avoid using the newest sole source brand narcotic and staying with the older anesthetics more.

Not all hospitals were equally successful in switching to the less expensive narcotic. In one academic medical center, the anesthesiologists refused to give up Sufenta, and the pharmacy department was not able to convince them of the cost effectiveness of the generic. In another hospital, the pharmacists did not believe the surgeons were working with their anesthesiologists on generic substitutions, leaving them with the responsibility for changing supporting physicians' drug use patterns.

Another drug substitution that was mentioned was the switch from the brand drug, Versed, to Valium (now off-patent) which could save considerable money in sedating patients undergoing cardiac catheterization. One hospital had given anesthesiologists cost and performance information on the two drugs in the hope of switching to the less expensive narcotic.

11.7.3 Vasopressors

Dopamine vasopressors stimulate contraction of the muscle tissue surrounding the arteries, thereby slowing blood flow. They are key to correcting hemodynamic imbalances caused by heart attacks, trauma, and bypass surgery. One hospital reported switching from the brand, dobutamine, to the generic, dopamine, and the pharmacy is now in the process of preparing a report on the cost savings to the hospital.

11.7.4 Anti-Coagulants and Diuretics

Anti-coagulants play a major role in the clinician's armamentarium in treating venous thrombosis and embolisms as well as allowing the blood to "slip through" occluded arteries. Heparin is commonly used as an anti-coagulant. Protamine is used to counteract the anti-coagulant effects of Heparin. One hospital pharmacy reported that generic Protamine cost $3.93 per vial versus $16.15 for the brand drug. At a rate of 1,700 vials per year, the hospital saved $20,774 in 1993 alone by switching to the generic. Proper management of a patient's blood flow is critical to early discharge. A patient can't be

discharged until properly anti-coagulated. At St. Luke's, surgeons have now delegated the decision to use Heparin to the pharmacists who claim to be achieving the 24-hour prothrombin time in 98% of the cases. This also saves on lab tests.

Diuretics also play a key role in managing heart patients. Brand name drugs such as Bumex and Lasix are used to treat edemas for congestive heart failure, for hypertension, and for renal disease as a comorbid condition. Lasix is reported to cost pennies per day versus $50 per day for Bumex. When one hospital began substituting the cheaper product for Bumex when possible, monthly costs fell from $7-8,000 to $3,500-$5,000. Annualized savings for 1993 were estimated to be $38,535, down 42% over the year before.

11.7.5 Anti-Infective Drugs

Hospitals spend large sums every year on anti-infective drugs. One hospital reported convincing surgeons to remove the expensive brand drug, Vancomycin, from the protocol and using the generic substitute, Cefazolin, exclusively. Cost savings were not available at the time of the interview.

11.7.6 Medical Therapy Drugs

Besides the drugs complementary to the care of bypass patients, cardiologists have many new drugs for the nonsurgical treatment of coronary stenosis. Probably the most well-known is streptokinase and its brand substitute, TPA. These drugs improve ventricular function in congestive heart patients by decreasing clotting, and in managing patients

experiencing heart attacks. They help clear occluded arteriovenous cannulae without invasive, risky, surgery. Although TPA is eight times more expensive than the generic drug, hospitals were continuing to use the brand as a result of recent clinical studies showing greater efficacy.

An excellent example of the new way of ordering drugs is the example of Reopro, a drug used during angioplasty for patients with high risk of reocclusions. It is reported to cost $1,300-2,400 per case, a figure that concerns the pharmacy department greatly. St. Vincent's in Portland and St. Luke's in Houston are two examples of hospitals that have taken a proactive step in controlling the drug's overuse. Pharmacists have reported the literature to cardiologists and pointed to severe side effects due to bleeding in certain patients--as well as the high costs. Both sites felt the diffusion of this drug would have been far greater under the old way of ordering drugs. St. Vincent's purchased two sets of doses, but hadn't used any in four months after educating physicians. At St. Luke's, the pharmacotherapy committee asked cardiologists to develop monitoring systems for the cost-effective use of Reopro which has helped reduce use considerably.

11.7.7 The Role of Surgeons in Drug Substitution

Pharmacists that were interviewed emphasized that changing physician attitudes were critical in substituting more cost effective generic drugs for brand names. In two of the demonstration hospitals, the pharmacy has had considerable success in getting surgeons, anesthesiologists, and cardiologists to try less costly drugs. This change in attitude,

pharmacists believed, is directly tied to the incentives to control hospital costs that physicians face under a single bundled payment. With the explosion in pharmacy budgets in the last ten years, hospital managers have pressured pharmacists to reduce costs wherever they can. But they do not prescribe inpatient drugs. Physicians do. And managers have not been willing or able to effect much change in drug mix. Prior to a few years ago, the medical staff "didn't give a damn" about drug costs, reported one pharmacist who has seen his scope of influence grow.

Under the demonstration, surgeons are taking a closer look at cardioplegic solutions, anti-coagulants, vasopressors, and anesthetics and how much they cost. They are working with their colleagues and the formulary substitution committees to try less costly drugs, based on comparative data and references from colleagues in other institutions. Having surgeons lead the discussion on drug substitution appears far more effective than pharmacists, who are often viewed as aligned with hospital "cost cutters" unconcerned with patient outcomes. Under the demonstration, physicians are now asking pharmacists to attend clinical meetings and to conduct performance and cost studies to see if a switch is possible. They are also challenged by what colleagues in other institutions are doing.

In spite of the incentives, not all pharmacy departments in the demonstration hospitals have been equally successful. Anesthesiologists in one academic medical center refused to substitute fentanyl for Sufenta. The surgical pump teams in two institutions were unwilling to standardize their cardioplegic solutions from 8 to 2 as recommended. Resistance rates to the generic anti-infection drug rose, and Vancomycin was readded to the

formulary. Nurses in the same hospital balked at substituting syringe pumps in pre-op for bags. Cardiologists continue to use many different kinds of ace inhibitors, frustrating pharmacist attempts at standardization. Based on subjective impressions, much seems to depend upon the aggressiveness of the lead surgeons. Where they are not willing to discuss changes with colleagues, the incentives under the demonstration are often not strong enough to have other specialists act on their own. This is especially true for anesthesiologists, who stand to gain little from any substitutions.

11.7.8 The Role of Pharmacists

How costly drugs are monitored and managed within hospitals has changed over the demonstration. Pharmacists will target, say, the top 20 most costly drugs in the hospital and review them for possible substitutions. If physicians ask for a special study, they will do it. Several study requests have been made under the demonstration, including albumin, Vancomycin, contrast media, and antibiotics.

The pharmacy staff have also played a role in changing standing orders for drugs. Physicians in the demonstration have been cooperative in general in reducing routine drug usage and substituting less costly drugs, such as oral ulcer drugs at $3 per day versus H2-antagonists at $10 per day.

Another way pharmacies have saved money is through carrying smaller inventories. A typical hospital's inventory turns over 12 times a year. In one demonstration hospital, the turnover is 29-fold due to daily drug deliveries from wholesalers. The key, pharmacists

report, is educating nurses to be comfortable with slightly longer waits to refill supplies. A second hospital uses Owens and Miner (a wholesaler) to guarantee stocks with only a 6% mark-up on wholesale prices. Over $700,000 is saved by not holding 4-month inventories.

To speed up drug availability on the floors, some pharmacies have put local dispensaries in the operating room area, the ICU, and in the Catheter Lab. This avoids wastage as well. As early as 1988, St. Luke's Hospital put two pharmacy technicians on every other nursing floor plus one per 30 beds in the stepdown units and one per 30 beds in the ICUs. They work closely with the nursing staff to provide first doses from the floors. They also have access to the patient charts and can make physicians aware of inefficient drug orders. Besides putting pharmacists on the floors, automatic drug dispensing units are also available to speed up dispensing.

Offsetting these benefits, the pharmacists reported, was an outdated formulary that was not distinct by service area. This makes it difficult to notify physicians that they have ordered an off-formulary drug. The technicians will substitute a generic drug, however, when it is clearly substitutable.

Practically all institutions have joined a purchasing group to buy drugs, thereby maximizing their market power. For example, by joining 48 other academic medical centers, one state hospital in the demonstration has access to over 7,000 products without going out for competitive bidding. Under the old system, the hospital had to seek competitive bids on over 700 product lines including several that involved less than $5,000 annually. With the joint purchasing arrangement, the hospital gets a two-year lock-in on prices along with a

bundled discount on the supplier's entire product line. The one drawback to this arrangement is that the hospital cannot secure best prices from particular suppliers of specialized drugs and devices, such as catheters. Thus, some potential savings to cardiac patients are foregone in order to save on drug purchases hospital-wide. One hospital reported a $3 million reduction in its $16 million pharmacy budget acquisition costs through generic substitution and joint purchasing.

11.7.9 Role of Demonstration in Changing Drug Utilization

It is not clear how much of the changes in drug utilization have come as a result of the demonstration and the alignment of surgeon and cardiologist incentives with the hospital's. Clearly, in a few institutions like in Atlanta, the surgeons have taken a direct role in drug cost containment by being in the demonstration, but it appears that few other places--possibly St. Luke's where heart surgery is so dominant--have targetted bypass surgery for drug studies specifically. The cause of change can come more passively, however, as surgeons back pharmacists' efforts to inform supporting physicians on their drug usage instead of siding with their colleagues to maintain the status quo. It so happens that many of the heart-related drugs are also the most expensive and, hence, receive attention over-and-above demonstration changes in physician incentives.

11.8 Operating Room

11.8.1 Volume Growth and Efficiency

Improving efficiency in the operating room is a special challenge. All hospitals joined the demonstration with the expectation that bypass volumes would increase, and with growth would come more intensive, efficient, use of the inmost expensive service. To date under the demonstration, the results regarding volumes have been mixed. In the two non-academic centers, bypass volumes have increased. In the two academic centers, volumes have been flat. In the three additional sites, volume growth has been very modest. In the two facilities with significant growth, one was performing 1,300 cardiovascular surgeries in 1993 in three dedicated operating rooms (out of 16) while the other facility was performing 1,920 surgeries (70% bypasses) in 4 dedicated rooms (out of 14). Of all the facilities, only St. Joseph's in Atlanta was fully utilizing available operating room time. Even in the other high-volume institutions, the cardiovascular suites were running 66% occupancy (with an 80% target).

One reason for slower-than-expected bypass growth is the explosive growth in angioplasty, which has siphoned off many 1, 2, and 3-vessel cases. Besides the growth of angioplasty, one thoracic surgeon also noted that there was "no more general surgery in the hospital due to the diffusion of endoscopy." While a slight exaggeration, endoscopic surgery does explain why surgical rooms are not as fully occupied as they used to be. More surgery is being done outside the hospital or in a much shorter time in the operating room. Also

mentioned as a factor in curtailing volume in one hospital was the new chest pain center that treated patients with drugs, first, before referring to surgery as a last resort.

Some practitioners made interesting comments on the reasons behind the inverse relationship between bypass volume and mortality rates found in the literature. Performing many cases gives the surgeon and anesthesiologist valuable experience in dealing with unusual cases. Weaning patients from the pump is critical. An experienced perfusionist can evaluate pump performance and modulate flows to speed up the process. Experienced physicians also are more sensitive to adverse changes in blood flows that are critical to operative success. Moreover, in a high-volume hospital, nurses and assistants are more adept at harvesting veins and avoiding damage by squeezing them too tightly. And the nurses in general are quicker to react to adverse events. There is a great deal of random response of patients to the trauma associated with bypass surgery. A team that has seen the gamut of responses are (a) quicker to respond to a problem in the correct manner, and (b) more likely to avoid adverse events in the first instance. In St. Luke's, for example, a sheet of variances in patient conditions is reviewed before the operation to help predict adverse outcomes. Without significant volumes, meaningful variances from norms are unreliable.

11.8.2 Bypass Surgery Times

Length of bypass surgery is important, not only to costs, but also to outcomes. Every minute on the pump or under anesthesia heightens risk. Times have fallen in the operating room. One operating room director reported that 3-4-vessel bypasses that took 4 hours in

1992, now take 3 hours. Redo's of patients with previous bypasses that used to take 8 1/2 hours now take 5 hours. Overall pump times may be longer in some facilities, however, because bypass patients are sicker with more vessels to bypass.

The key to short operating room times seems to be dedicated cardiac teams. Everyone in the room is doing specified activities concurrently: opening the chest, harvesting the veins, opening supplies and laying out instruments, closing up, packing supplies. Maximum efficiency using dedicated heart teams can only be achieved with high volumes. Otherwise, teams are broken up, some members performing other types of surgeries, some assigned to nonsurgical activities. Consistently high volumes allow teams to stay together for a full day, day after day. Failure to achieve volume growth may have hindered the two academic institutions in developing as many dedicated teams as the other two demonstration hospitals, with some foregone efficiency gains.

11.8.3 Operating Room Scheduling and Teams

Rapidity of room turnaround is the final crucial element in maximizing expensive operating room time. Two hospitals prided themselves on reducing turnaround times: one from 40 to 30 minutes; a second, from 30 to 23 minutes. Again, turnaround was not as critical in hospitals with constant volumes.

Who is in the operating room during the surgery? Teams vary slightly, but the standard group includes the thoracic surgeon, a physician assistant, the anesthesiologist, a perfusionist, and a scrub and a circulating nurse. Additional members may include a surgical

or anesthesiology fellow or resident. Most hospitals did not use CRNAs for bypass surgery although the highest volume facility did assign half (13) of their CRNA staff to bypass patients under anesthesiologist supervision. This institution, because of its dedication to heart surgery, had all 16 of its supervising anesthesiologists trained in bypass surgery, assuring maximum physician flexibility for emergency bypass cases.

PAs are common in non-teaching facilities while residents assist the head surgeon in academic medical centers. One academic center would not let the surgeon use physician assistants, arguing that residents needed the training. Problems arose, however, when residents were unavailable. St. Luke's in Houston has begun training RNs to be assistants at surgery to help in the harvesting of veins and in closing the leg and chest. A principal reason for the new program was the uncertainty in the availability of cardiovascular Fellows to assist with bypass and valve surgery. Several other sites also used PA's in the operating room, demonstrating the possibilities of substituting for a second surgeon even in the most complex surgery—at least for some tasks.

Three of the four hospitals ran standard weekday OR schedules, starting the surgery at 7:30 a.m. and finishing in mid-afternoon. The high-volume hospital was unusual in adding a fourth room beginning at 8:30 a.m. to stagger patients. This hospital also ran a regular Saturday open heart schedule with one team from 6:30 a.m. to 6:30 p.m. The reason for this, it was explained, was the high number of DRG 107 referrals that were made by outlying hospitals on Friday in order to avoid expensive weekend stays. In order to "capture" these referrals, the demonstration hospital made special accommodations for Friday night,

followed Saturday surgery to minimize overall stays. By contrast, one academic center reported performing only 1-2 open heart surgeries per month on a weekend with no Saturday surgery.

When angioplasty was first performed, all hospitals kept an operating room and bypass team on stand-by in care of failures requiring immediate revascularization. This was obviously very costly. As catheterization techniques have improved, and with the ability to use stents to prevent excess bleeding, PTCA "crashes" have become rare. Consequently, hospitals no longer have dedicated rooms and surgical teams waiting. In emergencies, the next available team will take the failed angioplasty. Staggering one of the rooms also reduces the waiting time in case of an emergency.

11.8.4 Purchasing Supplies and Instruments

Another way hospitals have been saving money in the operating room is by better managing and purchasing supplies. In one hospital, the largest surgical group meets weekly to discuss standardization of products. Among other things, this led to the standardization of the cannulas that route blood to and from the pump. After physicians agreed upon the product list, OR nursing staff give new surgeons the list of products that are used in bypass surgery. Knowing that their experienced peers designed the list minimizes requests for unusual supplies and instruments. In another hospital, all surgeons must bring all new equipment (e.g., valves, elbows) before a standards committee before bringing them into the operating room.

Operating room managers also report returning to reusable items such as lab coats, light handles, and gowns in order to reduce costs. Nurses are also saving by using supply packs that are opened only when necessary. As a result, one hospital manager reported going from $300,000 over budget in the operating room to $140,000 under budget through changes engendered, at least in part, by the demonstration's incentives for more efficient use of the service.

At another hospital, the head thoracic surgeon is the only one allowed to deal directly with outside vendors. He supports the hospital in standardizing valves and other supplies and discourages vendors from playing off one surgeon against another. Hospital staff, alone, are unable to limit access of vendors to surgeons and anesthesiologists, partly because of their lack of technical knowledge, partly because of a lack of control over physicians. Aligning financial incentives encourages physicians to police themselves.

11.9 Anesthesia

Three important changes have taken place in the way anesthesia is delivered that has reduced costs. One involves same day admissions in DRG 107; a second, the therapeutic substitution of low-cost generics for brand narcotics in the operating room; and the third, and most important cost saver, has been the trend toward earlier extubation after surgery in the ICU.

Because open heart surgery is so traumatic and usually requires several hours to complete, the anesthetics must be planned well in advance. Same-day surgery shortens the

time to develop an anesthesia plan, and anesthesiologists in general were resistant to the idea until recently. But over the last ten years, the growth in same-day surgery has been remarkable. Every year, more challenging procedures are being done on a same-day basis (or even as day surgery). Only in the last 5 years, however, has the concept been extended in any significant way to open heart surgery. Demonstration hospitals have been in the forefront of this change. The implications for anesthesia are significant. Now, patients visit the anesthesiologist's office at the hospital the day before surgery and give a medical history and other pertinent information to the nurse specialist. The patient is also instructed as to eating and other important behaviors the night before surgery. Anesthesiologists have had to make special arrangements for these interviews, unlike formerly when they visited the patient on hospital rounds the day before surgery. Having already established the protocols on other same-day surgery made the "jump" to same-day open heart surgery feasible within the short time-frame of the demonstration.

In Section 11.7, the substitution of fentanyl for Sufenta was discussed and need not be repeated here. Significant savings on brand narcotics have been realized in a couple of the demonstration hospitals, with definite spillover savings on non-demonstration patients because the drug switch was made for all open heart patients (unless patient condition calls for another drug which occasionally happens). Savings on narcotics, however, have been uneven across participants. Anesthesiologists will not change anesthetics unless pushed by surgeons. Hospital managers or pharmacists are usually unsuccessful in effecting a change in narcotics. Thus, much depends upon the willingness of surgeons under the demonstration

to push for therapeutic changes. Having comparative data from other institutions on the use of generics can be very helpful.

Early extubation has also been discussed in Section 11.5 under changes in the ICU. In all four institutions, anesthesiologists were aggressively taking patients off ventilators soon after surgery. Staff in one hospital reported that now 60-70% of patients are extubated on the first ICU day versus only 20% before the demonstration started. Patients used to remain on ventilators overnight. Accelerated extubation is cited as the primary reason ICU days have fallen by nearly 50% under the demonstration.

Although it was difficult to say what effect the demonstration per se had on the role of physicians in managing ICU patients after surgery, it appears that anesthesiologists may be taking a more active role than previously. Early extubation involves careful management of respiratory functions and is properly the domain of the anesthesiologist rather than the cardiologist or other attending physician. From other comments, discussed more fully in Chapter 13, there seems to be a trend towards more oversight in the ICU by the surgeon and anesthesiologist and less by consulting physicians.

11.10 Catheter Lab

Activities carried out in the catheter lab directly and indirectly affect the mix of patients undergoing bypass surgery and the overall costs of demonstration patients. All DRG 106 patients had their angiography performed at the demonstration hospital. The proportion of patients in DRG 106 varies considerably across the hospitals. In Atlanta, St. Joseph's

Hospital performed the angiogram on only 25% of its bypass patients compared with 61% at Ohio State University Hospital. Performing the angiogram adds over $1,000 to DRG costs, not counting the 3-4 extra days in the hospital versus DRG 107 patients. How efficient hospitals are in conducting these exams directly affects DRG 106 costs.

Probably more important is the indirect effect the catheter lab has on the number and mix of patients going on to bypass surgery. With the introduction of angioplasty, fewer patients are immediate candidates for bypass. The more aggressive cardiologists are in performing angioplasties, the fewer patients will be seen by the thoracic surgeon. Furthermore, as angioplasty techniques and technologies improve, only those patients with the most extensive coronary disease, or with left main disease, remain candidates for bypass surgery.

A wide range of activities take place in the lab, but they can be grouped into five domains: (1) electrophysiology (EP), including pacemaker insertion; (2) echocardiography; (3) noninvasive cardiology, including angiography; (4) invasive cardiology, including angioplasty; and (5) cardiac rehabilitation, including stress and Holter studies. Electrophysiology and echocardiology have been high-growth centers for most hospitals. EP studies were increasing 10% annually in one hospital while echocardiography was growing 13% annually over the last several years. Angioplasty, in general, has also been a high-growth area for most of the demonstration hospitals. In one hospital, the number of angioplasty procedures increased from 412 in 1990 to 618 in 1993. In another hospital, the lab was performing 22 procedures of all types in 1990 and was closing at 11 a.m. By early

1994, the lab was averaging 33 cases and remained open until 7 p.m. Much of this growth was due to the explosion in angioplasty.

Not all demonstration hospitals were enjoying volume growth. One hospital had seen angioplasty volumes decline from 1,400 in 1992 to 1,150 in 1994. The reason given for the decline was the opening of competitive labs in the market area.

The growth in angioplasties implies a more severe case mix undergoing bypass surgery. Other invasive cardiology procedures besides balloon angioplasty, including atherectomy (balloon with smaller cutters), rotoblades (high speed diamond drill), and lasers, also reduce the proportion of admitted patients going on to bypass surgery. (This ignores the potentially positive effects of a growing catheter lab on attracting more coronary patients in general.) One academic medical center estimated that only 25% of patients with triple-vessel disease were recommended for bypass while 60% underwent PTCA and the rest had drug therapy. In another non-academic institution, of patients undergoing angioplasty, about 10% had either left-main or triple-vessel disease. These statistics indicate a strong shift away from one- and two-vessel disease going to bypass, and even healthier patients with triple-vessel disease are having angioplasty as the first alternative to drug therapy.

Although the cost of angioplasty is not directly relevant to the evaluation of bypass surgery, it is interesting to note the high costs of this alternative. The catheters themselves cost only $15 each, but the balloon catheters retail at $700. Occasionally a stent is used in addition to secure the artery which costs another $680. The national average is 1.75 balloons per lesion, resulting in over $1,000 in balloon costs alone. In addition, expensive

anti-coagulants are required. One hospital cath lab director estimated that he spent $1.9 million annually just on medical supplies and devices, even after a 25% discount.

Rapidly rising costs in the cath lab has forced managers to become more efficient. One hospital has set up a 14-bed unit next to the lab to handle pre- and post-procedure activities efficiently. The primary reason for taking this step was to minimize downtime in expensive lab rooms.

Another efficiency-enhancing step was contracting with outside evaluators to provide comparative data and suggestions for improving lab procedures. According to the director, cardiologists "were amazed at what other physicians and labs were doing" in terms of number of balloons, the overall costs of procedures and drugs, room turnaround time, etc. Key to saving cath lab costs is maximizing utilization. Downtime is very costly in terms of staff salaries and underutilized equipment. For hospitals with a single cardiologist group, scheduling is simplified as one physician uses a room for the entire day. This is more likely in an academic medical center than a community hospital. In Atlanta, by contrast, St. Joseph's has 5 busy cath labs and 60 cardiologists in private practice. In this instance, extraordinary steps have been taken to minimize downtime. Teams have been formed with goals in terms of turning rooms around for the next patient. Average turnaround times fell from 55 to 25 minutes. Furthermore, average waiting times for cardiologists once rooms were ready were posted in the physicians' locker room. Almost immediately, waiting times for cardiologists fell from 35 to 15 minutes. Turn-around times will be systematically related to the "ad hoc" PTCA philosophy of the center. It may be more cost effective to follow an

angiogram immediately with angioplasty during the same lab visit. This naturally plays havoc with the schedule but saves time and money by eliminating a return to the lab later in the admission or readmission.

Standardization of supplies has also been at the top of the lab's agenda for cost containment. In one hospital, the number of different balloon vendors was reduced from 7 to 2. This allowed the hospital to negotiate large reductions in prices.

Many of the cost savings in scheduling and purchasing depend upon cardiologists agreeing on key issues. In academic medical centers, standardization is easier because there is a single practice for each specialty. Cardiologists also tend to be assigned rooms for the day rather than by patient. Patients are then assigned to rooms rather than physicians, thereby avoiding problems waiting for the next physician.

Some hospitals have made staffing changes to lower costs. Usually, each angioplasty requires a circulating nurse to monitor the patient's vital signs, a scrub nurse to assist the cardiologist, and a technician to control and monitor the equipment. Teaching hospitals may have up to five persons in the room, creating crowding problems. Another staffing change has been to substitute physiologists for one of the nurses. Much of the work is hard and physical in terms of transporting and shifting patients for viewing and manipulation of the catheter. Physiologists certified in pharmacologic testing can replace one nurse at half the cost. They also can be more attentive than a nurse who is trained for other purposes.

Assignments have also changed. Nurses in one hospital were now pulling the catheter sheaths in the post-operative room adjacent to the lab and sending patients directly to routine nursing. In the past, patients had been sent to the ICU where sheaths were removed at the cost of a day's ICU stay. Whether sheaths can be pulled in the post-recovery room depends on the success in PTCA dilatation. Long, difficult cases will generally require keeping the sheath in overnight to check the lesion the next day and to monitor anticoagulants.

A final area of cost savings in the cath lab concerns the use of contrast agents. In performing angiograms, either less expensive ionic or much more expensive non-ionic agents are used. Non-ionic agents are believed to be superior in avoiding renal failure and cardiac arrest, but the likelihood of adverse events are very rare in most cases. During the demonstration, one hospital switched from using non-ionic agents all of the time to just 50% of the time after outside evaluators showed cardiologists the equivalence of the two agents in terms of outcomes, coupled with the fact that their case mix was, in fact, not more serious than other institutions. A second demonstration hospital uses non-ionic agents only 30% of the time at a savings of $500,000 a year. Non-ionic agents are still used for patients with high creatanine levels that are at risk for renal failure.

11.11 Radiology

The radiologists were in uniform agreement that the number of x-rays taken on bypass patients had declined under the demonstration. Many sites used to take x-rays pre-

and post-operatively after pulling the ventilator tubes. Now, no standing orders exist in some sites. One radiologist estimated that the number of films of bypass patients had been cut almost in half.

While all sites had a capitated demonstration rate for radiology because films were always required at some point, the rates were very low. In fact, radiological services are rarely significant for bypass patients if angiograms are excluded. Only when patients have certain complications are MRIs or more complicated tests required.

12 Case Study Findings: Hospital Competition and Marketing

12.1 Introduction

A principal reason most hospitals gave for participating in the demonstration was to increase bypass surgery volumes. How successful they were in achieving this goal depends upon how they promoted the program. A vigorous, intelligent, marketing program, however, does not guarantee success. One obstacle to greater volumes may be internal conflicts and constraints within the demonstration hospitals, themselves. Some of these have been touched upon in Chapters 10 and 11. Others will be mentioned in later chapters dealing with the achievement of participant goals. But even if hospitals faced no internal problems, one cannot ignore the external competitive market. It is reasonable to expect competitors to respond, sometimes vigorously, to a local hospital being named a Medicare Bypass Center. Their efforts may thwart promotional attempts to gain market share by demonstration hospitals, leaving the market status quo ante.

On-site interviews were conducted in each of the demonstration hospitals to determine their marketing strategies and promotional efforts. As will be described more fully below, marketing was directed at three groups: directly to potential patients; indirectly to referring physicians; and indirectly to managed care plans. How successful were the participants in marketing to the three groups? Did the sites vary in their emphasis on direct versus indirect marketing? How was their marketing molded by their academic orientation

and how much by local market structure? Can any generalizations be made from just seven case studies about the success of the program in shifting market shares elsewhere in the country? These are the kinds of questions addressed in this chapter.

Besides interviews in participating hospitals, interviews were also conducted with two competitors.[1] Perceptions of the market will vary from hospital to hospital and from physician to physician. Secondary data on volumes, reported in Chapter 4, provide scant evidence of competitor responses to the program. Personal interviews with competitors supplied missing subjective information on how others in the community viewed the selection of a Medicare Bypass Center, what impacts it had on referral patterns, how competitors responded, and any problems competitors saw with the demonstration. Like those interviewed in participating hospitals, outside competitors had their biases, and it was impossible with quantitative data to evaluate some of the assertions made by either party. Nevertheless, documenting perceptions of the competitive process and how demonstration hospitals have behaved is key to producing a balanced evaluation.

12.2 Organization of Hospital and Competitor Interviews

To document the ways in which demonstration hospitals promoted the program, several interviews were conducted with hospital marketing staffs. These included the hospital marketing director, the marketing staff, the person responsible for private managed

[1]Other competitors who were contacted declined to be interviewed.

care contracting, and physicians involved in the promotional efforts or building primary care networks.

Questionnaires covered three broad areas: (1) marketing strategies; (2) managed care contracting; and (3) the responses of competitors. For examples of the interview protocols, see Appendix E.

Interviews with other local competitors were also conducted in order to gain a more balanced and complete picture of the nature of bypass competition and the impact of marketing by demonstration hospitals on competitors. Any problems or concerns with the demonstration were also pursued in the interviews. The original evaluation design called for at least one set of competitor interviews in each site. Difficulties gaining cooperation limited the interviews to just two competitors in two sites. One set of responses came from another academic medical center; another from a large private hospital. From just two observations, it is impossible to generalize on the nature of competitor responses to the demonstration. These interviews did prove valuable, nonetheless. First, they give a broader perspective on the organizational problems facing any academic medical center in aggressively pursuing global contacts of the kind envisioned in this demonstration. Second, some of the responses shed light on why the volume gains were or were not as large as demonstration hospitals expected. Third, competitors raised a few critical points about the contracting process and the possible behavior of selected hospitals that, if true, raise serious concerns about quality of care, and, if false, indicate the degree of misperception in the community that could undermine future contracting efforts.

12.3 Global Package Competition in Local Markets

Global bundled hospital-physician single payment had its beginnings in 1984 when Tennaco approached Dr. Denton Cooley at the Texas Heart Institute to find ways of controlling their high employee health care costs. The employer felt hospital costs were "out of line" and their employees were getting too many bills. In response, Dr. Cooley put together a flat rate covering all inpatient costs of bypass surgery and established the Cardiovascular Care Program. In 1985, Dr. Cooley submitted a sole source proposal to HCFA offering a single flat rate for bypass surgery that prompted DHHS's Office of the Inspector General to conduct an analysis of bundled pricing for CABG surgery (OIG Final Report, "Coronary Artery Bypass Graft (CABG) Surgery -- Assuring Quality While Controlling Medicare Costs," OAI - 09-86-00076, August, 1987). Using THI's CABG bundled prices proposed to HCFA, the OIG concluded that "annual savings are estimated to exceed $192 million," (p. 10) to develop the current demonstration a few years later. In January 1998, HCFA's Office of Research and Demonstrations issued a solicitation for applications willing to offer a single bundled price for all hospital and physician services provided Medicare patients undergoing bypass surgery. Today, THI has over 50 such contracts with Tennaco, Delta, and Medicare as well as with foreign governments.

All respondents felt that competition among hospitals and physicians had increased significantly in the last five years. This was the result of several factors. First, the growth of managed care had been dramatic everywhere, with the possible exception of Boston and Portland where it was already well established. Atlanta, Columbus, Houston, Indianapolis

and Ann Arbor could all be considered Stage I markets where HMO penetration is just taking off. Hospitals in these cities have not traditionally had to compete for private patients--at least not through third-party plans. HMOs have entered the Atlanta and Columbus markets in the last 5-7 years as they work their way down from the larger cities. In Ann Arbor, respondents felt that the United Auto Workers had discouraged the penetration of HMOs for many years due to their very rich, first-dollar, coverage with complete freedom of choice. Now that hospital costs have driven premiums to unaffordable levels, HMOs are gaining a foothold in Michigan and changing patient perceptions about the need for managed care.

In Houston, the HMO market, while growing, is still quite fragmented. The city is seen to be overbedded and ripe for managed care utilization controls, but the lack of an industry employee base served by many different insurers diffuses market power on the buyer side. Nor does Houston have any significant Medicare HMO population. Another reason for the lack of HMO activity until very recently is the early HMO failures in the mid-1980s that discouraged employers and providers. Employers have also resented the high profits being made by HMOs. Finally, freedom-of-choice is cherished among workers, further restricting the kinds of exclusive contracting open to HMOs. Hence, as late as the mid-1990s, HMOs were only 17% of the Houston market with the rest being point-of-service payment in varying forms (e.g., DRGs, discounted charges). Only lately has managed care begun to take a real foothold again in the city with more aggressive discounting.

St. Vincent's in Portland, Oregon, is clearly competing in a Stage III managed care market. Over 50% of hospital revenues in the city are paid through managed care contracts;

over 65% of the Medicare population are in at-risk plans. Price competition predominates. St. Vincent's PPO rates have increased less than 2% in 1996 while competitor networks have frozen their rates.

A second factor besides HMO growth affecting competition was the diffusion of catheter labs. Managers and physicians both cited the growth in the number of labs as detrimental to their bypass volumes. Noninvasive and invasive labs both affect volumes, particularly the latter. As competitors begin performing angioplasties as a substitute for bypass surgery, referral patterns change dramatically, and never in favor of established labs such as those in the demonstration hospitals. Hospitals with existing labs have opened them to outside cardiologists as well. After the Deaconess Hospital and Lahey Clinic in greater Boston both opened the labs to outsiders, their bypass volumes grew rapidly, taking away market share from University Hospital. Academic medical centers, including Ohio State University Hospital, have resisted opening their labs to cardiologists not on the medical school faculty. University Hospital finally did open its lab one day a week and has seen greater volumes as a result.

St. Luke's and the Texas Heart Institute have actually promoted the use of stents during angioplasty as a form of "niche" service that can be marketed to referring cardiologists. Stents are costly and complicated to insert and some physicians in one of the 33 local hospitals with cardiac catheter labs may prefer to refer candidates for stents to THI for care.

Finally, all demonstration hospitals face one or more major competitors. In Boston, University Hospital competes with nearly a dozen nearby hospitals that perform open heart surgery, including many academic medical centers with excellent reputations. St. Joseph's Mercy Hospital in Ann Arbor competes directly with the University of Michigan just a couple of miles away as does St. Joseph's in Atlanta with Emory Medical Center. Ohio State University is unique among the participants in being the sole academic medical center in a mid-sized city. It competes primarily against Riverside Hospital, a very aggressive, large, low-cost, community alternative to a teaching-research environment. Providers in downtown Houston boast the "largest medical center in the world" with 7,000 beds in just a few block area. Dozens of suburban hospitals ring the city, drawing off patients from the central core. Twenty-two open heart facilities perform bypass surgery in the city. Methodist, St. Luke's principal competitor, is a world-reknowned hospital operating adjacent to St. Luke's (Dr. DeBakey, its eminent surgeon, is a world renowned heart surgeon). It is alleged, however, that Methodist's volume is declining because it has refused to negotiate managed care contracts until very recently. St. Luke's also competes nationally and internationally, with 30% of its patients coming from the U.S. outside Texas and 10-15% internationally. The competitive advantages of large, nonacademic hospitals are enhanced in areas with growing managed care plans looking for packaged prices.

Under mature managed care competition, providers in the Portland market have merged into just 4 major networks, including Kaiser, the Providence System that includes St. Vincent's and Providence Hospital in downtown Portland, and two other providers, an

academic medical center considered a minor competitor and Good Samaritan, its other major private competitor. The large Portland HMOs have aligned with the few provider systems. Blue Cross, for example, contracts principally with St. Vincent's major competitor network.

Methodist's market in Indianapolis is similar to St. Joseph Mercy's in Ann Arbor in being a quasi-duopoly. Recently, Methodist merged with Indiana University Hospital to form a strong competitor to St. Vincent's, a competitor the equal of Riverside in Columbus with nearly half its revenues in cardiovascular care. In addition. St. Vincent's is in the more affluent part of town with fewer uninsured compared with Methodist Hospital situated downtown. The latter is responding by building satellite facilities to strengthen its referral network.

12.4 Marketing Strategies

Hospitals employ three distinct types of advertising: (1) direct advertising to patients in the media; (2) indirect advertising to referring physicians; and (3) indirect advertising/negotiating with managed care plans. Patients rarely make the decision of which hospital to choose for bypass surgery. Out of ignorance regarding quality, they rely mostly on referring physicians. Nor do they usually consider price, given widespread insurance coverage, especially among the elderly.

As a result, the demonstration hospitals have emphasized quality in their direct media advertising. As with Ohio State University and both St. Joseph's Hospitals, this usually takes the form of institutional advertising, emphasizing the quality of care across all services, not

just thoracic surgery. Ohio State University, in fact, did little direct advertising at all the first year. Surgeons felt that much of the market had already slipped away.

Academic medical centers are invariably slower at initiating direct media advertising to patients. The deans of medical schools often resist advertising, choosing, instead, to invoke a "they will come" philosophy. Large, prestigious medical schools have dominated the market for bypass surgery for such a long time, and their leaders are reluctant to admit that open heart surgery is no longer their exclusive domain. But with managed care limited patient access comes to direct patients more, deans are changing their perceptions of the market. In the last few months, University Hospital (now merged with Boston City Hospital to form the Boston Medical Center) has launched a radio and TV campaign promoting the new conglomeration. The bypass surgery demonstration plays a prominent part in their new advertising.

St. Luke's until recently did little paid advertising, expecting the media to cover their heart program because of its prominent reputation. Now that referring physicians and managed care plans have several good choices in town, simply building a heart program of high reputation does not ensure high volumes.

Non-academic hospitals such as St. Joseph's in Atlanta face the opposite problem of a lack of national recognition in spite of performing many more bypasses per year than Emory Hospital nearby. The same is true for St. Joseph's Mercy Hospital in Ann Arbor versus the University of Michigan. The Atlanta facility wisely emphasized quality in its media advertising. It also focused on national conferences and managed care plans to

convince physicians and insurers that their care was as good as that offered by the local academic medical center. Without doubt, the imprimatur of being selected a Medicare Participating Heart Bypass Center strengthened their marketing message considerably.

No hospital spent any time advertising low prices. Patients don't respond to prices, nor do referring physicians, for the most part. Managed care plans do, but they don't contract with hospitals through television or the newspapers. Institutional "quality" advertising assures patients that their referring physician or managed care plan has made the right choice in sending them to the non-academic demonstration hospital.

St. Luke's was interested in offering free taxi rides to pick up patients for the diagnostic testing and surgery, but the government disapproved such overt recruiting methods. (It is illegal for providers to directly reimburse patients for transportation costs, although providers can establish direct payment arrangements with taxi companies and airlines if they wish to.) The hospital has since published The Answer Book on cardiovascular disease, but mailed copies just to employers and insurance benefit managers who were encouraged to make them available to employees. Direct employer contacts are particularly important in Houston as many companies self-insure and work through managed care contractors.

One key form of direct advertising by St. Luke's and other participants informs potential patients that some HMOs limit access to St. Luke's. This form of informational advertising should become more common in all hospitals. The hospital has done some newspaper and TV ads recently, but marketing staff have lamented that there is "nothing

really to sell." Patients pay practically nothing for bypass surgery. They can avoid numerous bills, St. Luke's ads point out, but without a Centers of Excellence imprimatur from HCFA, the demonstration is transparent to patients.

Another reason hospitals did little to promote their heart bypass program separately from their general institutional advertising was that they did not want to alienate referring physicians through direct advertising. They felt it might appear that the hospital was "appealing directly to the patient in making the referral decision." One demonstration hospital went so far as to avoid blood pressure screening in malls and on a local campus so as not to appear to compete with local cardiologists whom they relied on for referrals. It was somewhat contradictory, then, to see the same hospital open up a Chest Pain Center that competed directly with office-based physicians. The argument for this was that it could avoid unnecessary admissions. Staff also felt the hospital was distant enough not to disrupt most practice patterns in town.

St. Vincent's in Portland did mount a significant media campaign when their selection to the HCFA bypass demonstration was announced. They followed with further announcements once the first demonstration patient was discharged. Other than this, the hospital has done no direct patient marketing except for plan-level advertising. All hospitals used to do more direct marketing in the mid-1980s, but high HMO penetration has materially changed the type of marketing away from direct advertising to building networks and negotiating with HMOs.

Another significant reason for the lack of marketing of the demonstration by St. Vincent's is the fact that it is part of the Providence Health System that includes another large local hospital. Financial analyses by the system CFO showed that the overall system would lose money if St. Vincent's took patients out of Providence Hospital, in part because Medicare would be paying the non-participating sister hospital undiscounted bypass rates. Hospital management also pointed to the high administrative costs of collecting and processing physician bills as a deterrent to marketing single bundled payment to private plans. Managers also noted that negotiating discounts with the medical staff was quite contentious.

One of the odder reasons for not marketing more actively to patients was the belief that the hospital was losing money under the demonstration. Some managers felt they shouldn't be "marketing a loser." This shows a lack of understanding of short versus long-run profits. None of the hospitals were losing money in the short run; on average, demonstration patients in each site were more than covering the hospital's variable costs, as shown in Chapter 6. Indeed, one of the reasons this same hospital gave for participating, initially, was increase volumes and cover more of the high fixed costs of bypass surgery, as well as "rebuilding" their reputation. Ironically, in an expanded demonstration there might be other hospitals that resist offering large discounts in the belief they will lose money. Yet, if they fail to vigorously market the program, their failure to increase volumes will become a self-fulfilling prophecy.

St. Luke's Episcopal Hospital has been wary of advertising its Medicare bundled payment arrangement for fear that other local HMOs might begin demanding flat rates without outlier add-ons. Moreover, staff felt that in many key ways HCFA discouraged active marketing by not naming the sites Centers of Excellence. Consequently, the demonstration is hardly noticed in Houston, although referring physicians have some knowledge.

One surgeon who was interviewed probably summed up the dilatory direct marketing strategy best by observing that we are witnessing "the end of direct patient marketing." The reason: managed care plans. Another surgeon mentioned the failure of HCFA to allow the site to market a Center of Excellence imprimatur. "HCFA recognized excellence [in its selection process], but then didn't give us the business." Thus, it is not clear what participants have to market to patients if no COE imprimatur is conferred by the government. Without it, short-run threats to volume due to the uncertainty about a competitor being named a participant will wear off in the long run as competitors witness the lack of patient triaging in a nearly "invisible" demonstration.

Marketing to referring physicians, employers, and to managed care plans are the key strategies used by hospitals. Most demonstration hospitals have also worked hard building a physician referral network. Half to two-thirds of all bypass patients in the demonstration fell into DRG 107, which meant they had their angiograms done elsewhere and then were referred. Some hospitals were buying up primary care practices. But building networks was problematic for the academic medical centers. First, the question of admission privileges

limited outside interest in joining the network. Second, university inertia discouraged networking. Again, "they will come" permeated the marketing philosophy. And lastly, the mission of teaching and research conflicted with the demonstration goal of greatly increasing bypass volumes and emphasizing clinical care.

St. Luke's was actively pursuing primary care physicians and cardiologists who had trained at THI who might refer their tough cases back to the hospital. THI was using a private company to identify new physicians and where they had trained in order to expand their physician network into surrounding counties. St. Luke's-THI have a physicians' relations department that has been visiting key referrers to maintain and increase their referral base. They have distributed THI's bypass demonstration brochure and have established a "command center" for referring physicians allowing telephone consults with THI surgeons and cardiologists. The center sends physicians computerized information of the cost effectiveness of different heart interventions and is developing a quarterly newsletter discussing ways to improve patient care management. As part of St. Luke's outreach program, the hospital runs breakfast meetings for corporate leaders, including the presidents of Delta, Brown and Root, and Tennaco, at which it presents them with preferred provider arrangements. St. Vincent's in Portland concentrates on marketing to employees already in HMOs and encouraging employers to include St. Vincent's in their plan choices. Most of the advertising, though, features the Providence Health System rather than just St. Vincent's. This approach, however, is inconsistent with the goals of St. Vincent surgeons who are primarily dedicated to the hospital and seek to expand their own volumes. St. Vincent's

draws from a large network of 20 referral hospitals, including 8 that are very active. By 1996, the Providence Health System had purchased 80 primary care practices to shore up their referral network. The hospital did not develop any special materials for referring physicians, although it did send a letter of explanation to them and gave two presentations in the local area. The purpose of the communications was to reassure referring physicians that St. Vincent's was not "experimenting" on any patients they might refer and that there would not be any change in quality. They were assured, for example, that patients could still continue to receive cardiac rehabilitation under the demonstration if needed.

At bottom, all hospitals are engaged in a marketing balancing act. They want more patients, but if they do too much direct marketing, or set up pain centers, or conduct screening programs, they might alienate referring physicians. If they concentrate on their referral networks, exclusively, managed care plans may render them obsolete overnight by awarding contracts to competitors. If hospitals start their own HMOs, and St. Joseph Mercy Hospital in Ann Arbor has a fairly large one called Care Choices, they risk alienating referring physicians not in their plan. Until all patients are in HMOs, hospitals will not be able to have a uniform, efficient marketing plan, and the efforts of their marketing staffs will work at cross purposes.

While it might seem that hospital direct advertising as a whole is in decline, nothing is further from the truth in most of the demonstration hospitals. Both Ohio State University and St. Joseph Mercy significantly increased their marketing budgets just prior to the demonstration. The former did so in response to focus groups' that commented that

promoting the hospital's "scientific pursuit" was ineffective. People wanted a "caring environment"; they did not want to be experimented on. Advertising budgets in most of the demonstration markets have risen considerably in the last 5-8 years as declining occupancy and per case reimbursement force hospitals to scramble for patients. But in the field of bypass surgery, referral networks have always played a dominant role. Hospitals are experimenting with novel approaches that encourage HMO subscribers to be sure their plan choice includes the HCFA bypass demonstration hospital.

12.5 Managed Care Contracting

All seven sites were actively engaged in managed care contracting. Some had developed their own HMOs. Most had Physician-Hospital Organizations (PHOs) of varying kinds. The Allegiance PHO in St. Joseph Mercy Hospital in Ann Arbor worked with physicians in building a new data system to manage patient risk, develop clinical profiles, adjust global bid rates, and assure quality of care. These joint ventures have also been used to develop best practice protocols in order to keep costs down and stay within the private global rates.

In some instances, e.g., Boston, managed care has emphasized full capitation, and local HMOs have refused to negotiate with University Hospital on a global price for bypass alone. (It does have an exclusive capitated arrangement with US HealthCare.) HMOs claim they want to reimburse physicians separately, as well, believing they can manage their professional services better than the hospital. Several sites noted that managed care plans

prefer per diem rates that allow them to "manage" the patient, which is a euphemism for getting them out of the hospital earlier. This suggests that plans believe they are better able to manage lengths of stay, leaving to physicians (in the per diem) all the disparate services a patient might need while hospitalized, especially in the first few days.

In other sites, however, global procedure bundling is alive and active. St. Joseph Mercy has two private global bypass contracts with First American Bank and Consumers' Power, Inc. These contacts are for a broad heart package that includes valves, angioplasties, bypasses, etc. St. Joseph's in Atlanta has been even more successful, negotiating bundled heart packages with Prudential, Cigna, Delta, and Aetna. Their physicians established a single entity that routinely collects all physician bills and packages them into a single invoice. Again, the focus is on "super bundles" for DRGs 106, 107, 112, 124, and 125.

Columbus Ohio, has recently seen significant managed care growth. Managed care is reported to cover 30 percent of the population versus 23 percent 3-4 years ago. OSU Hospital has 46 contracts: 14 based on a percent discount of charges; 18 per diem contracts; 6 DRG per case contracts; and 8 global per case payments. The last involves 5 specialty transplant and cardiovascular services and include both the hospital and professional services as subcomponents. The global private contracts involve a flat per case amount (say for a 7-10 day stay), with an additional per diem amount for longer stays plus a dollar outlier amount for extraordinarily costly cases. Any devices (e.g.; pacemakers, valves) are billed separately on a cost basis. OSU is also insisting that managed care plans contribute to GME.

At one point, OSU had lost the very large United Healthcare contract but the plan has resigned OSU in order to meet subscriber demands for freedom of choice.

The Houston market has seen growth in managed care more recently with Medicare at-risk HMOs proliferating, albeit still a relatively small percentage of the market. To date, HMOs have been shadow pricing and are no less costly than indemnity programs. St. Luke's is certainly the most successful bundled payment participant with 30-50 contracts. On the professional side, these contracts generally include an additional outlier per diem or discounted fees, unlike in the HCFA demonstration. So far, the hospital and surgeons have been able to avoid accepting risk on long-stay patients except for Medicare.

St. Vincent's in Portland has over 60 managed care contracts, including its own 25,000 member HMO and Kaiser and PacifiCare Medicare at-risk plans. St. Vincent's, however, has only 3-4 fully capitated plans; most are per diem or per case contracts. Under a private per case contract, the hospital as an additional outlier per diem that varies by DRG. The hospital negotiates separately with the plans from its physicians. When St. Vincent's finally decided to submit a bid for Travelers' Center of Excellence program, it originally did so only with core physicians but later was forced into including all consulting physicians as well. Ironically, the hospital had not seen any patients under the COE after six months in spite of giving better discounts than to HCFA. The hospital is seeking more fully capitated plans in other than just cardiovascular care, which is the hospital's recognized specialty. It recently lost a significant contract involving over 100 heart patients annually by not being as price competitive as its competitors. The primary reason for not discounting charges more

was the dominant volume position St. Vincent's enjoyed in the market. Like St. Luke's, St. Vincent's has turned down contracts without outlier provisions. Its managed care contracting team, in deciding on a bid, takes into consideration (a) projected volume, (b) exclusivity, and (c) special arrangements such as outlier payments. Outlier payment protection is highly desired given the high variability in the costs of cardiac patients.

Hospital management, while strongly supporting the notion of aligning physician with hospital incentives under fixed per case payment, pointed out the problems of limiting the demonstration to just a few DRGs. If Medicare bundled all DRGs, then the hospital and medical staff could make a more cost effective investment in changing administrative and billing practices.

Like St. Luke's, surgeons and cardiologists at St. Vincent's (as opposed to the hospital) have been very active in marketing their services within Oregon and elsewhere. Part of the reason is the limitation in local volume; part because of drastic declines in reimbursement for bypass surgery. Travelers Insurance was developing a Centers of Excellence program in Portland, but St. Vincent's saw no benefit in joining because of the lack of exclusivity. Joining would make more sense if patients incurred significant out-of-pocket bills by not using the COE; otherwise, St. Vincent's saw no reason to take additional financial risk without guaranteed volume.

Methodist in Indianapolis operates in a Stage I emerging managed care market with a very strong competitor. The participant is developing a set of bundled rates for related cardiac DRGs anchored by bypass and valve surgery and angioplasty. To these are added

AMI and other medical DRGs. "You can't have a Chest Pain Center of Excellence," noted one hospital manager who emphasized the need for "surgical anchors." Plans prefer a broader package of DRGs, in part, given the substitution of diagnostic and therapeutic approaches for cardiac care. Having a broader bundle of services assures the plan that it is comparing apples with apples across hospitals with different clinical approaches to heart care.

Like elsewhere, Methodist's managed care contracts are based primarily on per diems in a few clinical areas, e.g., medical, surgical, psychiatric, ICU. However, within the major cardiac DRGs, the hospital provides a per case rate, instead, using its experience under the heart demonstration.

Methodist's success marketing global bundled rates has been limited. A set of rates were negotiated with the large Blue Cross plan for heart surgery, but the insurer couldn't sell the plan because allegedly there were too many exceptions. It became too costly for Blue Cross to write all the exclusionary software. This complaint also was heard in Boston.

Most demonstration hospitals were quick to credit the Medicare program with their success in the private market. Where they have been successful in negotiating private contracts, financial officers have "expensed the experience" and cost of setting up the infrastructure under the demonstration. Now, private contracting requiring merged data management and billing processes are already in place.

St. Luke's is a notable exception where extensive bundled payment contracting was already well underway. Managers at St. Luke's pointed to a problem they had in negotiating

private contracts that had implications for their Medicare demonstration as well. Their competitor, Methodist Hospital, was able to offer deep discounts to PruCare that St. Luke's could not because it lacked the capacity to take on another 50 cases per day (St. Vincent's, Portland, faced a similar capacity constraint). It was not so much the total volume as the mix of maternity cases that was problematic because of capacity constraints in St. Luke's nursery. On the other hand, the hospital has been quite disappointed that the HCFA demonstration has not resulted in any noticeable volume increases. Why they are disappointed is not clear given that they admitted they did not promote the demonstration due to their already well-known reputation and for fear private insurers might eliminate outlier per diems from their contracts. This suggests an asymmetry in benefits flowing from the Medicare bundled arrangement as compared to private all-or-nothing contracts for hospitals already near capacity. With Medicare's bundled rate and beneficiary freedom of choice, the hospital is not committed to taking on an uncertain number of new patients, making it more flexible and, hence, more attractive.

12.6 Competitor Perceptions

Competition for bypass patients has increased dramatically over the past ten years for three principal reasons. First, many more hospitals are performing the complex operation. Second, the introduction of angioplasty has siphoned off many patients that would have been candidates for bypass surgery. And third, the almost complete disappearance of cost-based reimbursement of hospitals in favor of per case reimbursement and private capitation has

made them far more volume conscious. Certainly, competition was quite keen in all sites--even more so now than when the demonstration applications were first reviewed nearly eight years ago.

Staff at the two competitor institutions were quick to point out the emergence of new hospitals, managed care plans, and catheter labs that made their job more challenging. Their responses are presented under seven headings.

12.6.1 Competitive Barriers in Academic Medical Centers

Two of the demonstration hospitals were academic medical centers devoted to teaching and research. One of the competitors that was interviewed was also an academic medical center. All three expressed common problems. First, all three admitted that they lacked a primary care network so important now with managed care and per case payment in filling hospital beds. In the past, academic medical centers saw little need for such a network. They generally provided the most complex care in the community, and local physicians naturally referred all their difficult cases to them. With the diffusion of high-tech services to more hospitals, the near-monopoly position of these centers has eroded considerably.

Building primary care networks appears especially difficult for academic centers. A major barrier is the lack of hospital privileges by local physicians. Once referred, family physicians cannot see patients in the center and bill for their services, nor do they retain any oversight for the patient's care. These centers also have a reputation for impersonal care

delivered mostly by residents that discourages referrals as long as a viable choice exists elsewhere in the community.

Even recognizing the need for a network has been slow. One respondent admitted that the medical school dean "didn't see the need to build a primary care network" until the hospital experienced serious volume declines. Managed care plans were taking patients out of their hospitals because they could not provide the full spectrum of care. And without patients, there is no teaching and no research. At some point, university administrators have had to reemphasize the clinical side of their practices and have begun setting up satellite facilities and buying up practices.

The cumbersome bureaucracy inherent in an academic medical center, most respondents have noted, puts physicians at a distinct competitive disadvantage. With so many independent fiefdoms to satisfy, coupled with university requirements for privileges, credentialling, salaries, and contracting, referring physicians and managed care plans "just go elsewhere." In a few instances, the center's cardiovascular physicians have formed a Heart Institute to negotiate global contracts with private plans. Academic centers without these institutes remain at a serious disadvantage in a fast-moving market. Another advantage of the Institute structure is its ability to implement more efficient practice patterns. A prime example of this are the critical pathway protocols. Without them, it is difficult to streamline the care of bypass patients and coordinate specialty care at key points. A difficult issue has been the perennial cross-subsidization of financially weak specialties. With declining volumes, an Institute arrangement deals with this problem explicitly.

One of the academic medical centers in the demonstration has had difficulties retaining is specialized heart staff, including thoracic surgeons, anesthesiologists, and invasive cardiologists. Often, the more entrepreneurial physicians leave the hospital to practice in a competitor hospital where incomes are determined more directly on work effort and clinical care. This is another way in which academic medical centers are at a disadvantage; namely, in the competition for highly paid heart specialists.

12.6.2 Growth in Competitive Catheter Labs

Coronary bypass patients are triaged in large part depending upon where they have their angiography. Over time, many new catheter labs have opened, radically changing existing referral patterns that favored the major medical centers. Early on, catheter labs existed almost exclusively in these centers. As more smaller hospitals adopt the service, local cardiologists have more discretion in where they will refer patients for bypass surgery. Even more significant, recently, is the addition of invasive cardiology and angioplasty. This further alters referral patterns, generally to the detriment of the large academic medical centers. Without strong primary care networks referring patients to the center for diagnostic angiography, and possibly bypass surgery, medical centers have seen more and more patients treated in smaller community hospitals.

One solution is to allow local cardiologists access to the medical center's catheter lab. But these labs have been closed to outsiders who lack academic credentials. Naturally, these

cardiologists have gone to other local hospital labs, or started one in their own hospital, thereby siphoning off cases.

One manager of a catheter lab in the demonstration felt it was an advantage that the medical center had a statewide reputation and referral network. He believed that the opening of labs in the local market, therefore, had little effect on the hospital's heart volume. While true, the fact that the medical center drew on patients statewide also meant its referrals were affected by the opening of a new lab anywhere in the state. In effect, the far-flung reputational network of the academic medical center has narrowed markedly in recent years. Most centers have had difficulties responding to this fundamental change requiring more attention to local markets and services.

12.6.3 Marketing Strategies

One of the competitor hospitals was surprised that the demonstration hospital did not do more local advertising. Instead, it chose to promote itself nationally to a greater extent. And when it did advertise locally, it emphasized quality over price, even though competitors felt that it was selected primarily on its low bid price.

This suggests that a demonstration hospital's advertising strategy depends upon who it is. Generally speaking, an academic medical center does not need to advertise its quality, especially statewide or nationally. What is more at issue is the costliness and impersonality of its care. It needs to advertise its familiar, accessible care at reduced costs. The demonstration hospital promoting itself nationally felt it important to convince patients,

employers, and insurers, that it was an equally high quality institution without the expensive academic relationships. In this regard, it was quite successful. The observation that it did not advertise its selection and low prices more extensively is probably true. The hospital realized that referring physicians and managed care plans determined where patients would go. General price advertising to the public falls on deaf ears, especially for expensive heart bypass surgery. The place to discuss price is in private meetings with employers and managed care representatives. This kind of promotion is not nearly as visible to competitors, although they learn by losing contracts to lower cost bidders. The two non-academic participating hospitals have been quite successful in wooing plans through their lower prices, aided by the imprimatur of being a Medicare Participating Bypass Center offering high-quality care.

12.6.4 Potential Conflicts of Interest in Joint Cost Sharing

One of the competitor hospitals felt that surgeons in the demonstration hospital faced conflicts of interest in receiving bonuses for reducing hospital costs. Indeed, staff claimed that "physicians at [x] were laying off nurses to get larger bonuses." The ethics of physicians sharing in cost savings is a thorny one, and many practitioners have questioned joint hospital-physician contracting and even HMOs as unethical.

The crux of the argument stems from the fact that physicians traditionally have considered the hospital their "free workshop". Physicians make practically all the key diagnostic and treatment decisions without bearing any of the institutional costs. Some have

argued that this is as it should be. Only if support services are free will physicians make optimal decisions regarding the patient's welfare.

This argument has definite theoretical flaws and has been used to explain overtesting, too much surgery, iatrogenic illness, and unnecessarily lengthy hospital stays (Pauly, 1980; Harris, 1977). Physicians every day make decisions on diagnosis and treatment that balance costs with benefits, including the cost of their time and the patient's time. To ignore the most expensive input to bypass surgery, namely, institutional costs, creates a severe bias in favor of hospitalization and reduced physician input.

On a practical level, the conflict-of-interest argument is becoming increasingly academic. Managed care plans are putting physicians at risk for both primary and institutional care. This is the way it must be because they make the decisions that allocate resources.

Have physicians under the demonstration laid off nurses for more bonuses? In the two nonacademic hospitals, physicians have received financial bonuses or other pecuniary returns for reducing ICU stays, working with clinical staff to shorten routine stays, conserving on tests and consulting visits, and substituting less costly drugs. Whether they changed their practice patterns for financial gain is impossible to say, although there is no reason to believe they would have supported such changes in lieu of the demonstration. The more pertinent question, of course, is whether the changes were cost effective. From our empirical analyses of patient outcomes, it appears that patients have not suffered from the

cost reductions; thus, it would appear that demonstration surgeons have introduced more cost effective treatment methods.

12.6.5 Gaming the Demonstration

Another concern voiced by competitors, at least in one site, was that surgeons may be gaming the demonstration by selectively operating on easier cases. Some thought they may be taking less difficult cases as a few very difficult cases were referred to the competitor. It is admittedly difficult to measure case severity given variability in coding comorbid conditions. Lung, liver, and stroke problems can be "overcoded" to appear to be operating on more serious cases. Interestingly, in another site, the competitor believed that surgeons in the demonstration hospital may be taking on cases that were too risky. Our clinical data set sheds little light on this allegation. Addressing this concern would require independent examination of the medical records, and even then it would be difficult to validate the accuracy of the record. In the evaluation of patient outcomes, a glossary of definitions for comorbid conditions was provided clinicians, but it is unclear how assiduous they were in following the guidelines. In any event, no trends were found in mortality rates in any demonstration hospitalJuly 23, 1998 that would be expected if riskier patients were being treated.

Another gaming strategy that was mentioned involved reclassifying expensive patients outside the demonstration. With the redefinition of most bypasses from DRG 108 to 106-7, this potential problem would appear to be minimized. Nevertheless, staff at one

competitor was concerned that bypass patients might be dumped into DRG 468 if unrelated procedures were done during the same admission. They also wondered if demonstration surgeons were keeping patients on ventilators an overly long time in DRG 467, thus exempting them from the demonstration.

12.6.6 Disappointment with the Application Process

One competitor was quite upset with the government's handling of the selection process. First, as a losing applicant, they were disappointed to see that other hospitals with higher rates were accepted into the demonstration. Second, when the government adjusted the payment rates for the four participating hospitals for more expensive DRG 108 bypasses, one competitor felt that the selection should have been reopened to the other applicants. To them, this constituted a significant change in the patient sample. Whether this was reason enough to reopen the selection is debatable, but eventually HCFA invited all six losing finalists to submit updated applications. Three did so and were subsequently selected to begin the demonstration in May 1993.

13 Case Study Findings: Hospital Payments to Physicians

13.1 Introduction

When HCFA solicited proposals from applicants, the Agency requested that a global price be offered that covered all institutional and physician costs for Medicare patients undergoing bypass surgery. The Agency also insisted that the price proposal be presented in two parts reflecting the programmatic split between Part A, Hospital, and Part B, Physician. This was done in order to estimate the Part A and Part B discounts offered by the site. When charging the Part A and B trust funds, HCFA split the global price into Part A and B amounts. These amounts were gauged such that the coinsurance amount was lower than a Medicare patient would be likely to incur at that hospital for DRG 106 or 107. In effect, HCFA shared the discount received with the beneficiary (or his/her supplemental insurer). It was also necessary to appropriate demonstration outlays between the two funding sources.

Hospital applicants were also told that how they decided to split the global payment with physicians was entirely their decision. They did not have to follow existing payment rules under Medicare and could offer HCFA different discount rates on hospital and physician services. HCFA was only interested in the total discount represented by the total global price. Moreover, providers could change their internal split any time they wished, although HCFA's global payment and estimated patient copayments would be unaffected.

A more detailed description of how the Agency evaluated the proposals was included in Chapter 3 of this report. In summary, hospitals knew exactly what Medicare was paying them for DRG 106 and 107 patients, although they did not know with any certainty how much their bypass patients were actually costing them. Most of the hospitals had accounting systems (of varying degrees of accuracy) that allowed them to make independent estimates of their institutional costs. By contrast, no system existed to track the multitude of physician payments for inpatient services provided bypass patients. Medicare Part B physician payments were available, although no centralized data base existed in any participating hospital at the beginning of the demonstration. In lieu of extant data, hospitals either collected bills from physicians seeing bypass patients and calculated average Medicare Part B payments, or they accepted physician estimates of payments.

On the other side of the negotiating table, HCFA had the advantage of having national Part A and B bill records that could be used to estimate average payments per bypass patient in each of the hospitals. When it came to negotiating rates, some hospital administrators were surprised to see how little HCFA was paying physicians, on average, for DRG 106 and 107 patients.

Several policy and technical issues concerning the division of HCFA's global payment between hospitals and physicians are worthy of study. First, can and will hospital managers and physicians work together to submit a global bid and participate in negotiations where both groups offer discounts? The demonstration has already answered this question in the affirmative. Second, how did the two groups arrive at their original bids and settle

upon discounts? Third, over time, does cost-sharing occur between the two groups? Fourth, if efficiency gains are realized by physicians in their treatment of bypass patients, are they recognized in their split of the global payment? In another vein, during the first year of the demonstration, the Congress passed legislation rolling back several procedure prices pertinent to bypass surgery. These rollbacks required HCFA to reduce the Agency's global payment in future years by an actuarial amount equal to the share of these procedures in the total payment. HCFA also made adjustments in the Part A component for changes in relative values, local wages, etc. Thus, a fifth policy question is how hospitals responded to these payment adjustments in splitting the global payment. Sixth, did any technical changes in care or mis-estimates result in payment shifts? And seventh, how quickly have hospitals paid physicians once they performed a service under the demonstration?

13.2 Organization of Interviews

Several persons were interviewed concerning how physicians were paid under the demonstration. The key informant was usually the manager of the demonstration. Also interviewed were the CFO and persons responsible for billings and collections on the hospital side. Counterparts on the physician side, including thoracic surgeons, were also interviewed. (See Appendix E for the interview protocols.)

13.3 Setting the Initial Payment Level

Four specialties were regarded as integral to the care of bypass patients. These included the thoracic surgeon, the cardiologist, the anesthesiologist at surgery, and the radiologist. These four specialists invariably received a fixed capitated payment for every demonstration patient regardless of services provided. Rates varied by DRG, with cardiologists receiving far larger payments when patients had their angiography performed in the demonstration hospital (in DRG 106).

Determining how much to allow for other consultants proved far more challenging to hospitals because patients varied in their requirements for consulting services. Based on limited billing information, hospitals developed rough estimates of how much of the global payment to set aside for consultant bills. The usual policy was that consulting physicians would bill the hospital using Medicare allowable fees. They were never allowed by HCFA to bill carriers directly. They had to be paid directly by the hospital out of the global payment. Payments to consultants came from a set-aside in the capitated amounts of the four principal specialties involved in every case.

Hospital administrators negotiated initial discounts with surgeons and cardiologists that varied considerably by applicant. After further face-to-face negotiations with HCFA staff, the two groups reevaluated their original estimates of Part A and B costs and established fixed rates. Physicians tended to overstate average Medicare payments as distinct from their charges. For surgeons, the only variability in Medicare allowable payment involved the number of vessels bypassed, making the hospital's task easier. For other

physicians who provided a mix of services, such as cardiologists, the setting of a global average payment was more difficult. Some hospitals were able to obtain more comprehensive payment information from physicians than others. The lack of complete bills and payments created tensions later on when final rates were negotiated with HCFA and distributions of the global payment began.

In the beginning of the demonstration, none of the four original hospitals had any formal rules for changing the negotiated rates with physicians, although a couple said they would wait and see what happened to hospital costs. This was before the RBRVS procedure rollbacks mandated by Congress led to reduced global rates.[1] Other administrators said they had no intention of changing the split because of the large discounts already offered on the Part A portion of the global bid. There seemed to be considerable skepticism that surgeons would or could achieve significant cost savings for the hospital.

13.4 Changes in the Hospital-Physician Split of the Global Payment

Over the course of the demonstration, the proportion of the global fee paid to physicians increased in all participating hospitals for three reasons:

(1) Technical changes and mis-estimation;

(2) Implementation of RBRVS and adjustments to the Part A component;

(3) Bonuses and in-kind payments.

[1] Some service prices rose under RBRVS, but CABG and other hi-tech procedure prices fell significantly.

Technical Corrections. In one hospital, the average payment to radiologists was ratcheted downwards after the rate was determined to be excessive. According to hospital administrators, the error was discovered after cumulating a number of radiologist bills on several demonstration patients and comparing the average Medicare allowable with the radiologists' original estimate.

By contrast, analysis of submitted claims on demonstration patients in the same institution resulted in an increase in the average cardiologist payment for DRG 106, with an offsetting reduction in DRG 107. Because the catheterization is such a large part of the cardiologist payment for DRG 106, and given that only certain cardiologists perform the angiography while other cardiologists may provide medical care on a case, it was also decided to pay separately for the catheterization. It was relatively easy to carve out this procedure for separate payment because it is always made for DRG 106 patients and never for DRG 107 patients.

Adjustments for RBRVS and PPS. Implementation of RBRVS payment rollbacks for overpriced procedures presented a special challenge to the demonstration. First, HCFA staff had to make an actuarial determination of the effect of the rollbacks on each hospital's global payment. This involved multiplying the typical number of services in a Medicare heart bypass treatment basket (e.g., surgeon, anesthesiologist) by the allowable Medicare Fee Schedule payment amount in different years for each market area.

From interviews with participants, it appears that none of the surgeons or other capitated physicians in the demonstration had their average payment reduced because of

mandated changes in the Medicare Fee Schedule. That is, all physicians in the core specialties have been sheltered from the overpriced procedure rollbacks and continued to receive at least what they were being paid by Medicare prior to the start of the demonstration and often more. This produced an implicit shift in the split of the demonstration global payment away from hospitals towards physicians.

Surgeons at most of the hospitals argued that they had already offered a significant discount (estimated to be between 10-25% by surgeons in two institutions) and felt they should not have their fees ratcheted down even more for RBRVS. In three of the original institutions, hospital administration seemed comfortable with maintaining physician rates at their original levels, but the issue of the payment split was quite contentious in the fourth institution. Having offered very large discounts on the Part A side, coupled with a failure to generate any volume growth over which to spread fixed costs and overrunning consultant bills, hospital management asked surgeons to absorb the RBRVS reduction. They refused, arguing that the hospital had "signed a contract" for a fixed payment, as had the other specialists, and everyone should "stick with it [the payment split]." Surgeons argued successfully with the hospital that they had already offered a significant discount and should not have to reduce their fees even further. The hospital, of course, could have made a similar argument.

HCFA has also made adjustments in the global payment for changes in the hospital prospective payments for the two demonstration DRGs. This has resulted in lower average payments, particularly for DRG 107 which had a significant reduction in its relative value

The net effect of the annual DRG price adjustments was to leave the proposed discount unchanged per DRG based on current program relative prices. On the other hand, rates have been increased based on the allowable increase in the PPS market basket inflation (see Chapter 3).

In spite of reductions in global payments, all surgeons and cardiologists in the demonstration have been insulated from any reductions in specialists fees or PPS adjustments taking place in their market areas. (In fact, some have done much better than that because of bonuses and in-kind payments, as discussed below). In three of the four original hospitals, it appears that surgeons, who comprise half the DRG 106 payment to physicians and 60% or more of DRG 107, have had their base rates (before bonuses) fixed over the period of the demonstration. Thus, while they have not experienced any RBRVS rollbacks, they have not had their fees updated for inflation either. Cardiologists in at least one of these hospitals, on the other hand, have seen their average payment increased 30% to correct an original mis-estimation, leaving the overall financial split between the hospital and physicians unchanged.

As the demonstration progressed, payments to the two key physician specialties improved. At Boston University, cardiologists reported receiving 40% more than they would have received under RBRVS. At. St. Joseph's Mercy in Ann Arbor, administrative staff calculated that physicians were receiving 110% of their expected RBRVS payments while at St. Joseph's, Atlanta, the bonus sharing program has added even more to surgeons' and cardiologists' incomes. At St. Vincent's in Portland, the five capitated specialties were

reportedly receiving 100% of billed charges on their Medicare bypass patients--well above RBRVS rates.

In-kind Payments and Bonuses. Sheltering surgeons against large RBRVS rollbacks has been one definite advantage of participating in the demonstration. Beyond this, they have enjoyed other benefits in two institutions. In one case, surgeons have received three valuable in-kind services as a consequence of the hospital achieving significant cost savings on bypass patients (including non-Medicare patients). First, the hospital made more operating room time available to them. A request for more time had fallen on deaf ears before the demonstration. Once surgical operating room times began to drop, the hospital responded by improving access to the cardiovascular surgeons.

Second, the hospital took over the salaries of the surgeons' physician assistants, who had been previously employed by the surgeons themselves in the operating room. This may amount to a $40,000 savings annually for the practice and possibly more. Besides the employment change, no other change was made in the way surgeons used their assistants. Hospital management felt it made sense to convert their surgeons' assistants to hospital employees in that they were working full-time either in the hospital's operating room or seeing hospitalized patients pre- and post-operatively. Naturally, working under a combined global payment was key in the hospital's thinking. Either the hospital paid for them directly or indirectly in the physician's portion of the payment. Besides, the surgeons had more than paid for the switch from savings elsewhere in the hospital.

A third way the hospital helped surgeons was by taking over the salaries of the clinical nurse specialists who used to work for the physicians managing their patients before and after hospitalization. Again, the hospital felt that these nurses should work for the hospital if they were actively implementing critical care pathways in the ICU and elsewhere in the facility.

One hospital in the demonstration went a step further and is now providing cash bonuses to physicians who practice in a more efficient manner. The hospital implemented its Cost Reduction Allocation Program for cardiac surgeons designed to reward surgeons differentially for their efforts in reducing hospital costs. Once physicians had demonstrated their willingness and ability to materially reduce costs, hospital administration recognized their efforts by developing a formal method of sharing the savings. The program works as follows:

(1) Eligibility Criteria:
To be eligible for any cost sharing, the surgeon must meet minimum quality standards, defined as:

(a) Falling within two standard deviations of the average hospital-wide bypass surgeon rates on mortality, complications, returns to the operating room and ICU, readmission rate, and use of consultants;

(b) The overall results of a hospital satisfaction survey of demonstration patients must exceed the overall hospital average; and

(c) A surgeon must perform at least 15 demonstration bypasses a year to be eligible.

(2) Payment Rate:

(a) In 1993, the surgeon received the greater amount of either:

(i) his current updated negotiated rate minus 3% but not further reduced for RBRVS reductions; or

(ii) a rate adjusted upwards for shared cost savings.

(b) The eligible surgeon's cost-adjusted rate (payment) under (ii) would be equal to PAYMENT = RBRVS + .25*HOSPITAL COST SAVINGS

(c) Hospital cost savings are defined as the difference between the surgeon's actual average hospital cost per bypass in 1992 minus the expected cost under normal inflation and intensity increases. Savings are further based only on the hospital's variable costs (which are determined to be roughly 60% of 1993 average costs in the facility, see Table 6-1), assuming these costs are under the surgeon's control.

Thus, under the allocation program, all surgeons are protected from RBRVS rollbacks by receiving at least their original negotiated rate under the demonstration, with annual updates, minus -3% for a minimum efficiency gain. Surgeons can earn more than their original rates if one-quarter of their savings in hospital variable costs, when added to the RBRVS allowable, exceeds the original amount that they would have received.

According to the manager of the demonstration in this hospital, some surgeons averaged over $3,600 in hospital variable cost savings per case in 1990-92. This translates into $900 in extra payments per case over-and-above what they would have received if they had been under the Medicare Fee Schedule. Based on the surgeons' negotiated rate with the hospital at the beginning of the demonstration, this amounted to roughly a $400 increase per case at a time when Medicare bypass fees were falling nation-wide.

Payments to cardiologists, radiologists, and anesthesiologists appear to have had their rates fixed, at least between 1992 and 1993, but they were not reduced due to RBRVS. As happened in another institution, separate rates are paid for invasive versus noninvasive cardiologists involved in DRG 106 cases. The payment differential is 4:1.

Payment to consulting physicians is made on a flat, capitated rate, basis, but only if they are involved in the case. Pulmonologists are subject to the flat amount for less than 20 visits with a patient. Beyond 20, they are paid on a fee-for-service basis.

13.5 Paying Inpatient Physician Consultants

Paying for consultant services during the inpatient stay has been by far the most contentious issue in private, nonacademic institutions. The question appears to be of little concern in the two academic medical centers. Consulting pulmonologists and other support physicians at Boston University or Ohio State University sometimes didn't even know how they were being paid under the demonstration. Three explanations for the sharp difference between academic and nonacademic centers were offered. First, and most salient, consulting physicians were on salary in academic institutions and their incomes did not depend upon referrals. Second, many specialties such as pulmonology have a large portion of their salaries covered by research grants. And third, large endowments to the faculty covering up to half the physician's salary greatly reduces any pressure to bring in revenues for the department. It is also quite likely that consulting physicians are less often used in academic medical centers given the availability of residents and the dedicated surgeon and cardiologist staffs.

The bundled payment impact on consultant payments in nonacademic centers was far greater. It appears that the degree of frustration on the part of consulting physicians varies with the intensity of care they were providing prior to the demonstration and how aggressively the surgeons were at curtailing consultations. St. Joseph's, Atlanta, has been the most aggressive, possibly because previously they had used consulting physicians the most. Surgeons reported using consulting physicians in the past as a recognized quid pro quo for referring patients. It was referred to a "body part" consultation. Now, the new payment incentives have changed this behavior. Under the new payment system, consulting physicians are paid on a pre-established flat payment per case, but only when they are called in. The surgeon now will call for a consult "if they really don't know what is going on" or for "legal" malpractice reasons. Pulmonologists were particularly angry over the decline in their business. Surgeons began using assistants, they claimed, and it became the "macho thing" not to call in consultants. Consultants felt doubly betrayed because their flat rates per case with the hospital under the demonstration were based on an expected consulting rate that did not materialize. When consults by infectious disease specialists fell from 8% to 2%, the surgeons agreed to return to fee-for-service payment amounts on an as needed basis. Surgeons also recognized that any remaining consults were more difficult now that the consulting rate has fallen so much. Furthermore, some clinicians felt that surgeons may have increased consulting rates on their valve cases to partially make up for the large declines on bypass cases.

Other hospitals, too, greatly overestimated the withholds required to pay for consulting services. One hospital distributed $236,000 in unused set-asides for consultants to surgeons and cardiologists. Consultants were paid 80% of Medicare RBRVS allowables but only for the first 10 days of care. Consultants were at risk, as were the surgeons, for care beyond this period. One important argument made to consulting specialists for this arrangement was the increase in volume that would be realized in the demonstration, an increase that never materialized.

Still another hospital had $60,000 left over from a consulting (or outlier) pool generated by putting $600 per case aside for consulting services. The hospital and physicians rejected a 20% withhold in favor of paying full RBRVS allowables out of the pool. Evidently, the reduction in utilization was more than enough to pay consultants full Medicare rates and still produce bonuses to surgeons and cardiologists. Interestingly, the hospital took full responsibility for any overruns in the consulting pool--supposedly to gain the physicians' cooperation for the demonstration. Yet a third hospital also "wrote out big checks" to the five capitated specialties for underspending the consultant pools.

Dissatisfaction with the consulting payments, where they have occurred, has been targeted mainly at the surgeons and cardiologists and not at the hospital.

13.6 Collecting and Paying Patient Copays and Deductibles

Under Medicare Part B, physicians must bill patients for any deductibles or copays. When the global rates were negotiated between HCFA and the hospitals, an actuarial average

amount representing the patient's obligation was determined for DRG 106 and 107, separately, and taken out of the amount paid directly by HCFA Central Office to the hospital.

The responsibility for collecting the patient portion of the global fee fell in all cases on the hospital. Physicians no longer were responsible for trying to collect the Part B deductible and copays either directly from patients or from their supplemental insurers.

Collection of the supplemental coinsurance payments from insurers has been very onerous for hospital staff. Physicians have been sheltered from all of the difficulties, however, through prompt hospital payment. In the one hospital using a formula to pay bonuses for efficient practice, its total payment to physicians also includes an estimate of the extra amount that it expects to collect from third party payers. It is assumed that 87% of patients have supplemental insurance. Based on hospital experience of collecting 70% of the maximum allowable copay, a fixed amount is added to the RBRVS program payment and any bonuses the surgeon is eligible for. The other hospitals appear to be paying physicians the full amount of the patient deductible/copay calculated by HCFA.

Not only are physicians not held responsible for collecting patient obligations, they are being paid the supplemental amount even before it is collected by the hospital. In Ann Arbor and Atlanta, physicians are being paid immediately for all of their portion of the global rate, excepting any set aside for consultants, plus any bonuses. This payment occurs either upon discharge or after the principal surgeon, anesthesiologist, and cardiologist bills are submitted to the hospital for inclusion in the packaged invoice to HCFA Central Office. In the two academic hospitals, physicians are reported to be paid within two weeks of discharge.

In one of these hospitals, radiologists because of slow submission of their bills are being paid only after HCFA pays the hospital.

The cash flow advantage to physicians of the hospital paying the program and supplemental insurance payment promptly is significant. Many physician practices are accustomed to submitting bills for payment the day after the procedure is performed even before the patient is discharged. Under the demonstration, no physician can bill third party carriers or supplemental insurers, but rather, must direct their bills to hospital accounting. Once the patient is discharged and a minimum of three significant bills are submitted, the hospital can forward the package for payment. This often takes several days after discharge. Payment is made by HCFA within 30 days, according to hospital billing/collection department staff. Were physicians required to wait until the hospital was paid the government's portion of the global rate, payment lags could be triple what they ordinarily would be. HCFA's delay in updating global rates created an additional lag in 1994 payments of three months, according to hospital staff. Physicians, again, were sheltered from these delays as the hospitals continued prompt payment.

Delays in collecting from the supplemental insurance carriers have been far longer than from HCFA, averaging 3-4 months, if payment is ever made. (See Chapter 15 for details on the problems of collecting the supplemental insurance.) According to hospital financial managers, the hospital has been responsible for collecting these extra payments with no delays to physicians.

13.7 Conclusion

From the way physicians are being paid under the demonstration, it appears that they have been financial winners for the most part, with the notable exception of consulting physicians. All physicians have been sheltered from RBRVS rollbacks over the last few years. Surgeons practicing in most of the nonacademic medical centers have enjoyed significant bonuses, either in the form of in-kind benefits or supplemental bonuses to their negotiated rates. All physicians have been sheltered as well against most delays in receiving HCFA program payments or supplemental insurance payments.

Surgeons and cardiologists, it should be noted, have earned their preferential treatment in most of the hospitals. They have introduced many cost saving changes in clinical practice that have made demonstration patients more profitable to hospitals. Indeed, because these changes extend to non-demonstration bypass patients as well, hospitals are saving even more money than suggested by figures for the demonstration alone.

In summary, the principal capitated surgeons and cardiologists have financially benefited from the demonstration. This has occurred in 4 ways:

1. Sheltering surgeons from RBRVS rollbacks by freezing their previously agreed upon payment splits with the hospital;

2. Reducing consulting physician services and sharing in the distributions from the consulting physician pool;

3. Sharing in bonuses and in-kind payments from the hospital for improving patient care practices.

4. Receiving full payment for patient deductibles and copays from the hospital.

It was strongly felt among some surgeons that aligning physician with hospital incentives was key to instilling an active cost containment program. Hospital staff could only do so much to change practice patterns. Only the key decision makers, for example, could reduce consulting physician services, discharge patients earlier, shorten ICU stays, etc. Under existing Medicare Fee Schedule arrangements, no physician has incentives to oversee the use of consultants; indeed, incentives exist to overuse them. The same is true of hospital services, which surgeons treat as free goods.

As expected, consultants were most dissatisfied where their incomes suffered the most. But even in these institutions, some grudgingly admitted that complication rates were down in some areas due to better practice patterns such as faster extubation times.

The use of incentives was wholly different in the academic medical centers where the debate over teaching and clinical contributions is reaching a high point. One of the centers was introducing a volume incentive program for physicians that would reward them for seeing more patients. Nevertheless, salaried faculty physicians have generally been less responsive to financial incentives, nor has the university been inclined to use incentives to change behavior. Possibly the one positive offset to the lack of financial incentives in AMCs to over-provide services is the lower consulting rate and use of nonbilling residents.

14 Case Study Findings: Hospital Achievement of Participation Goals

14.1 Introduction

In Chapter 3, several different reasons were offered initially by participants for participating in the Medicare Participating Heart Bypass Demonstration. Competitive pressures were cited as one reason for joining the demonstration. All participating hospitals had good reasons for wanting to protect or expand their current market shares. Another reason for participating was the hope that the Medicare demonstration imprimatur would increase volumes and hospital profits. While the participant would be receiving less than they might have under Medicare prospective payment for DRG's 106 and 107, the extra volume, it was hoped, would add to the hospital's (and physician's) bottom line. A third reason for participating, less often mentioned than others, was to reduce the costs of care. This could be accomplished, hospital managers believed, either by implementing more efficient hospital management methods under the incentive of a lower negotiated payment rate, and/or by bringing physicians under the same bundled payment rate and forcing them to internalize hospital costs.

In this chapter, the reasons each hospital had for participating are reviewed in the light of nearly 3-5 years experience under the demonstration. It is important to evaluate the demonstration's success from the participant's perspective for several reasons. If participants are satisfied with the outcomes, they are likely to continue. More importantly, satisfied

participants would encourage other hospitals to accept a single bundled payment. On the other hand, if participants are disappointed with some aspects of the demonstration, it is important to understand why. The design of the payment scheme might be improved based on feedback from participants. Failure to achieve all goals may also derive from barriers or constraints within the participating institution or from competitive responses on the part of nonparticipating hospitals. Knowing the source of the disappointment or satisfaction speaks to the generalizability of the demonstration to the rest of hospitals performing open heart surgery. Certain hospital or area characteristics may be more conducive to expanding bypass caseloads and market shares. In hospitals and markets with similar characteristics to those in the demonstration, program effects may also be similar, although with just four original demonstration hospitals, generalization is limited.

14.2 Organization of Interviews

Extensive interviews were conducted with the key decision makers in each participating institution, including the

- Chief Executive Officer,
- Chief Operating Officer,
- Chief Financial Officer,
- Manager of the demonstration,
- Vice-president in charge of government affairs,
- Managers of marketing
- Managed care contracting.

In addition, we interviewed the head thoracic surgeon at every hospital regarding the reasons physicians decided to participate and how successful the program had been in their view. In

every hospital, one or more of the respondents was involved in the initial decision to participate in the demonstration. These persons were key because they were most knowledgeable about the original goals and could speak to the overall success of the demonstration from the beginning.

During the first three years of the demonstration, very little turnover occurred at the top decision-making levels. All four CEOs remained, and almost all of the CFOs and COOs continued in their positions. All four hospital managers of the demonstration remained with the hospital as well, although three left for other positions in the industry shortly after the first three years and a fourth retired.

Each person was asked to review the reasons for participating in the demonstration and whether their original expectations had been realized. (See Appendix E for the interview protocols.) Goal areas given special attention included changes in volumes and market shares, management of costs, organizational changes, and hospital-physician relationships.

14.3 Initial Proposals

Of the 27 sites originally invited to submit final applications with discounted prices, 10 were recommended by the application review panel. 4 were selected to be inplemented in 1991. The remaining 6 were invited to update their applications. Of the three who did not resubmit applications, one was interviewed as part of the evaluation. Unfortunately, no interviews were conducted of those not included in the top 10 as to how they developed their bid discounts.

The one site interviewed that did not resubmit reported that it was extremely unhappy with the bidding process. They had felt they had submitted a highly credible bid with a reasonable discount and could not see why a competitor across town was selected. Some of the physicians felt that special inside information tainted the bidding process, but no evidence was provided nor has the evaluator uncovered any. If fact, all three of the sites that resubmitted were approved by HCFA and included in the second round of the demonstration. There is every reason to believe the other three non-rebidders would have been included, too.

Among the successful rebidders, one felt that their first bid was "too complicated." Their bid was in two parts. Until they reached their base period bypass volumes in any year, they proposed to continue to be paid the usual Medicare Part A & B rates. For any volume increases, they offered a modest discount. Their bid also included an additional outlier per diem payment for any stays longer than the median. Such a bid was clearly unresponsive to the intent of the demonstration. It kept all the financial risk with the government instead of the provider taking on risk for greater volume and longer stays in return for a "Seal of Good Approval," as one CEO characterized the federal imprimatur. In retrospect, the site had a point in being wary in offering large discounts without an official Center of Excellence imprimatur. Managers at the site claimed that HCFA staff told them when, at first, they were not selected that the government was choosing only small "new" hospitals for the demonstration, a claim strongly denied by the HCFA Project Officer.

The same site (and one other site) also voiced a concern having to do with their low costs. It thought that "the demo was unfair in that [the hospital] already had low costs and

couldn't offer a high discount." HCFA, of course, was aware of this problem, which is why the actual bid price level was also considered in making the final site selections. Admittedly, though, discount rates were weighted more than price levels in selecting sites. There was no evidence, however, of a low price site being rejected because it also had a low discount.

Another site was frustrated that the government refused to cover the extensive administrative costs of participating in the demonstration. It, too, had a valid point that participation costs ran well over $100,000 annually in extra clinical and financial reporting, in identifying demonstration patients, in billing supplemental insurers, etc. On the other hand, such costs were equal across all sites and could be considered part of the discount that was offered; that is, any site's net discount offered equals its gross discount (unobserved) minus any administrative costs it expected to incur. Had HCFA allotted a fixed amount per site for administration, it would rightly have expected a larger discount.

The rest of the sites had no particular problems with the selection process. Some hospitals that had relied on physician estimates gained useful information from HCFA on the Part B actuarial cost per case. Physicians occasionally systematically overstated what the government was paying them per case, either by overestimating the intensity of services or by using charges instead of payments. When the three hospitals submitted their revised bids in the second round, more accurate Part B estimates were provided.

14.4 Volume Growth and Market Shares

Of all the demonstration goals, volume growth was probably paramount in the minds of participants as well as HCFA. The imprimatur of being named a Medicare Participating Heart Bypass Demonstration hospital, even without any guarantees of exclusivity in local markets, was expected by most participants to result in more bypass patients being admitted, accompanied by a shift in market share in their favor. As shown in Chapter 4 above, two of the four original hospitals in Atlanta and Ann Arbor did achieve significant volume and market share growth, although Atlanta's early gain in market share disappeared due to substantial growth in several competitors.[1] The two academic medical centers in Boston and Columbus, Ohio, had mixed results. Both University and OSH hospitals saw their market shares decline through 1992 but then experienced growing shares through 1996. From 1990 through 1996, BU hospital still experienced negative market share growth while OSU actually achieved a net gain in share. In the two sites with significant growth, there was a difference of opinion about how important the demonstration was. In Atlanta, most of the key hospital and physician staff believed that the designation helped considerably in increasing volumes. It did so, respondents believed, because the hospital was now viewed as a true Center of Excellence with a national reputation for treating heart disease it lacked before the demonstration began. In Ann Arbor, the feeling was that the cardiologist network played a more important role, being very active in the southwestern part of the state. In fact, one physician felt that the demonstration may have had a chilling effect on some referring

1 St. Joseph's in Atlanta still had a 33% increase in Medicare bypass volume from 1990-1996.

physicians who were philosophically opposed to surgeons working with the hospital under a single bundled payment. It is impossible to evaluate this assertion, but there is no doubt that all four original hospitals and their physicians met considerable hostility from some competing hospitals and physicians who were opposed to the concept of a bundled payment and the alignment of hospital and physician incentives.

The two academic medical centers that failed to achieve significant volume gains were also of two minds as to why they didn't realize this goal. In Boston, the participating hospital had relied fairly heavily on a distant referral network in Albany, New York, and Manchester, New Hampshire. Both of these shrank considerably with the introduction of bypass surgery capabilities locally. The demonstration had nothing to do with the large loss in patients, it may have helped replace the deficit in the local Boston market. Survival under such circumstances was viewed as a positive aspect of being in the demonstration. As a minor performer of bypass surgery in a very large market dominated by several academic medical centers, University Hospital has always been as much concerned about maintaining its market as it has about taking patients away from its competitors. Being named a demonstration hospital conveyed some prestige, but in Boston several other heart hospitals enjoy even more prestige, and growth in market share would be unreasonable to expect without an exclusive arrangement. Roughly constant volumes, respondents felt, was an achievement of some sort. Interestingly, hospitals that did see their shares grow were not the most prestigious, suggesting that the Medicare imprimatur was not as important as other factors in this highly competitive market.

In Columbus, Ohio State University Hospital is in a somewhat different situation being the only academic medical center in the city. While strides have been made in organization and patient care management, the hospital's failure to achieve significant volume growth until very recently was disappointing, especially given the deep discounts it offered. According to one physician, an ambitious goal of 1,000 bypasses (Medicare and non-Medicare) was set at the beginning of the demonstration. In 1993, the hospital performed only 443, or slightly more than one a day. Reasons for limited volume growth were many. Some physicians were unhappy with the quality and aggressiveness of the hospital's marketing efforts. Some felt that HCFA had abandoned the hospital by not promoting the demonstration and had misled them about the right to waive patients' deductibles and copays. Originally, hospitals wanted to waive deductibles and copays only for beneficiaries with no supplemental insurance. HCFA asked hospitals to withdraw this proposal as unacceptable. Still others felt that the turnover among surgeons and other key physician staff prior to the demonstration had a long-run impact on volumes.

St. Vincent's Hospital in Portland was the most disappointed about the lack of volume gain. This was especially true given the site's limited interest in aligning physician with hospital incentives to lower costs. Managers felt their costs were already competitive. Lack of exclusivity was a big issue as was HCFA's failure to allow the site to market the hospital as a Center of Excellence, although the site admitted that other private HMOs (besides Kaiser) were not good at directing patients either. St. Vincent's originally applied for the demonstration worried, in part, that a key competitor would receive the implied

Center of Excellence imprimatur. The hospital was willing to bid a reasonable discount in the hope of becoming a "regional heart center," as advertised in the solicitation to join the demonstration. When asked if being named a Center of Excellence would have helped marketing the demonstration, the head of marketing responded that what would really help him greatly would if he could say that "three hospitals in Portland applied, and St. Vincent's won." (HCFA did not release the names of non-selected applicants.) Clearly, targeting cities and conveying a COE imprimatur is something sites can really market versus competitors.

But there several other reasons why volume growth failed to materialize at St. Vincent's. First, as part of the Providence Health System, the site did not want to market the demonstration and take away lucrative heart patients from its sister institutions. Indeed, hospital management thought it was being penalized in having a system and not being allowed to market the demonstration across several member hospitals. Second, nearly two-thirds of Medicare patients in Portland are already in at-risk HMO plans; hence, there was limited opportunities for triaging the elderly to St. Vincent's. Third, the site lacks a strong financial relationship with its physicians for coordinating and winning private care bundled bids. Fourth, the site saw itself as being dominant in the market already and that, in retrospect, the demonstration was more suited to smaller, less prestigious hospitals in greater need of a governmental quality imprimatur. For all of these reasons, St. Vincent's eventually declined toapply for the Participating Centers of Excellence Demonstration.

Methodist Hospital in Indianapolis also saw no change in its bypass market share as a result of the demonstration. Managers also admitted that they had not marketed the

demonstration aggressively believing that "advertising doesn't move market share." Marketing a "Good Housekeeping Seal of Approval" only engenders offsetting advertising from competitors. Methodist does operate in a city with (a non-participating) St. Vincent's Hospital, which is very well known for its cardiovascular care and quite aggressive in maximizing its market share.

At St. Luke's in Houston, the emphasis was clearly on increased volume. The hospital is highly dependent on cardiovascular cases and had been experiencing declining volumes in the recent past. Furthermore, both the hospital and the surgeons very concerned that a very large prestigious competitor situated a block away might be selected. In the end, the site did not feel the prestige of being selected for the demonstration increased volume to any degree. Greater volume was also seen as key to reducing costs as more than 50% of bypass costs are considered fixed. Given the high prestige of the institution already, they were a bit at a loss as to how to market the global payment arrangement and the "less-than-definitive" Centers of Excellence imprimatur. At best, the demonstration was more a "labor of love."

14.5 Private Managed Care Contracts

An unexpected benefit of participating in the demonstration developed in the area of managed care contracting. When the demonstration began in early 1991, virtually no private payers were negotiating bundled surgical packages. Immediately afterwards, payers in three of the four original sites began developing global pricing products and negotiating with

hospitals for exclusive contracts. In Atlanta, in particular, the publicity, along with the changes in physician practice patterns engendered by the demonstration, led directly to other private global packages. The Delta package was cited as one, highly visible example that hospital management believes would have been difficult to secure for a nonteaching hospital without the imprimatur of the demonstration. The spillover effects of the demonstration on private managed care global payment contracting, therefore, should not be underemphasized, however difficult they may be to quantify.

Another advantage of participating in the HCFA demonstration was the kinds of cost and quality information required and how such data help to inform hospital managed care staff in negotiating private contracts. Hospitals felt they were in a better position than their competitors in evaluating the true cost of bypass and other surgeries and (a) could better justify their costs to insurers and (b) avoid undercosting services. More than one site admitted that they had turned down certain contracts because they had good internal costing data on the services used by company employees.

There is a general feeling, voiced at a couple of sites, that the site will no longer bid the lowest cost to secure a private contract. Using the costing data developed under the HCFA demonstration, a few sites are emphasizing total package costs for cardiac care, including hospital and all physician costs across several alternative treatment modes. In this way, they are able to put numbers behind their claim of offering "best value" to managed care plans.

14.6 Cost and Patient Data Bases

Three of the four original participating institutions also believed that the demonstration had spurred them to improve their cost and patient data base systems. Only one site found the reporting requirements attendant to the demonstration particularly onerous and quite costly. For this, it seems that some managers see detailed report development as a long-term investment while others see the costs involved as essentially offering HCFA deeper discounts. Both physicians and hospital managers recognized that their existing data systems were either inadequate to measure the true cost of demonstration patients or were not being used to their full potential. In particular, detailed micro-cost information on the patients of individual surgeons was not generally available.

Two of the four original hospitals either had a micro-cost system in place or were finalizing its implementation. One other hospital, realizing the inadequacy of its old costing system, adopted a micro-cost system and began producing reports after two years. A fourth hospital has rejected a detailed micro-cost system as too expensive, too complicated, and taking too long to implement. By the mid-1990s, the three additional sites had micro-cost systems. The principal surgeon at St. Vincent's supported the government's requirements for good clinical and cost data collection, but, of course, "they already had a superior system and were very cost conscious because of HMO managed care."

The importance of accurate, detailed, costing systems to a participant's success in the demonstration cannot be overemphasized, as explained in Chapter 11. Changing physician behaviors by making them more cost conscious requires accurate, procedure-specific data

presented in meaningful reports. The two are not synonymous. A hospital can have an excellent micro-cost system but lack ways of reporting costs to physicians to support useful discussions of practice pattern differences. This was often the case. But to the participants' credit, most providers contracted with an outside consulting firm to merge cost and patient information and provide comparative data from other hospitals. Armed with these reports, the firm's staff worked with physicians on areas where they were shown to be outliers and how savings could be made by reducing the time from "cath to surgery", in pharmaceuticals, in ICU time, in the use of consultants, and in contrast agents in the cath lab, to name just a few improvements. Physicians work in a micro world, one patient at a time. Each patient is viewed as different, requiring different services. But when services are properly costed, then aggregated across each physician's caseload, patterns emerge among clinicians that were unknown or only vaguely understood. Once patients are stratified by meaningful risk and severity factors, e.g., previous bypass, age, etc., surgeons can talk more precisely about variations in resource and drug usage among themselves and with their colleagues in anesthesia and cardiology.

More disaggregated cost data by type of patient has also helped managers do their job better. Only in the last ten years have administrators become immersed in the arcane area of practice patterns. Under cost-based reimbursement, there was no need to know what different patients cost or why costs varied so much for similar patients in the same institution. DRG per case reimbursement forced managers to take an interest in the cost of the "bundle" of services across the entire admission. Not only that, but to focus on the costs

of specific conditions. A single bundled payment, that includes physician services as well, goes a step further in bringing clinicians into the management loop.

Under the demonstration, administrators and clinicians worked together to produce meaningful reports and to understand how to make practice patterns more efficient. In order to do that, nonclinician administrators needed to learn much more about coronary artery disease, angioplasty, and bypass surgery, and why costs might vary among patients. While hospital staff became more knowledgeable at all seven sites, in only some of the sites did the manager of the demonstration appear to have an intimate working knowledge of the management of coronary artery disease. In general, managers delegated responsibility, probably appropriately, to clinicians and nurses who were given responsibility for working with physicians and department heads to make patient care more efficient.

Even in the hospitals with excellent micro-cost systems, the analytic reports that were produced fell short of what could have been done. Surgeons in all hospitals maintained clinical registries on their bypass patients. While these registries were deficient in a few respects, they contained a wealth of information on patient risk factors, severity, disease anatomy, extent of surgery, complications, and outcomes. Yet, few hospitals appeared to have merged their micro-cost data with the clinical registries and stratified costs by patient characteristic at the patient level. Hence, few were able to say, for example, how much more costly a patient was who had had a previous bypass before entering the demonstration, or why such patients were more costly. And while the micro-cost data base could distinguish the use of generic fentanyl from the expensive brand name, Sufenta, as a surgical anesthetic,

hospital staff were generally unable to stratify patient outcomes using the two drugs by key surgical risk factors to show clinicians the costs versus outcomes. (Actually, pharmacists in one hospital did conduct such an evaluation, but not through a merger of the two data bases and extensive adjustments for patient risk factors that would have been required.)

The one hospital that failed to invest in a detailed micro-cost software encountered major problems in changing clinician behavior. Physicians felt that the inability of administration to tell them the true costs of tests and procedures was a sign of indifference regarding costs on the part of management or, worse, an effort to hide savings from them. The problem stemmed from the use of an antiquated cost reimbursement system based on cost-to-charge ratios at the department level. Spreading all direct costs in the operating room across a heterogeneous mix of operations and reporting an average cost for bypasses alone, obviously has little meaning if one is trying to change practice patterns for a specific procedure. The treatment of indirect overhead costs was also controversial, and physicians felt costs were being overstated. Finally, physicians were aware that the old cost-to-charge system had been manipulated by hospital accountants to maximize reimbursement under cost-based payment in ways having little to do with the true costs of care. To simply apply it to costing bypass surgery patients raised serious questions regarding its verisimilitude. To management's credit, they have now seen the value in upgrading their micro-cost system and are in the process of implementing a new system.

Besides supporting the improvement of internal management, administrators in all hospitals felt that micro-cost systems, married to key patient demographics and medical

record information, were critical in negotiating managed care contracts. Unless a hospital and physicians had solid estimates of true patient costs, especially variable costs, they were at a disadvantage in negotiating global payment rates with local managed care plans. Those with such systems said that the private sector liked to see managers and physicians take an active interest in costs and practice patterns for identified conditions, and back that interest up with numbers.

14.7 Cost Reductions and Efficiency Improvements

Without question, the most noteworthy achievement of the demonstration has been better cost management of bypass patients. In a time of 4-8% annual cost inflation, one hospital "set an ambitious goal of saving $1,000 per bypass patient, and we achieved it." Another participant was able to reduce variable costs by even more in absolute terms, in spite of rising wages, new and more expensive supplies, and the like. A third hospital's management, while not having the detailed cost data at hand, knew that practice patterns had changed and that lengths of stay, which had been abnormally long, had fallen significantly. All of these institutions ascribed the program's success to the alignment of physician with hospital incentives. Once physicians, and especially surgeons, recognized that their use of hospital resources was not "free" to them, they energetically reviewed the cost reports and discussed them with their colleagues to see where savings could be made. Indeed, in some cases, surgeons were ahead of hospital management in asking for particular reports. Yet another hospital had an outside managementconsulting group come into the institution and

help cut costs even before it entered the demonstration. Achieving significant cost reductions through altered physician practice patterns was a major reason Methodist Hospital joined the demonstration. As a result, the cost of bypass surgery was lower in 1996 than four years earlier, reversing a long upward cost trend. As a result, several hospitals were "making money on Medicare bypass surgery" in spite of the discounts. One site contrasted this performance with congestive heart failure patients which were just breaking even without discounting.

Although some efforts were made to negotiate lower product prices or make departments run better, cost reductions were almost always the result of efficiency improvements in patient care management, These improvements, in turn, appeared to be the result of active surgeon involvement in patient management, reinforced by the implementation of clinical nurse specialists tracking patient flow. One hospital noted that shorter operating room times freed up time for other surgeons and allowed the hospital to reduce nursing staff. Another site noted that they weren't performing any elective surgery on the weekends before the demonstration, nor were they performing any same day surgery. Now they do both.

A spillover effect of better cost management was also noted by administrators. Probably the most salient spillover effect was on bypass and other cardiac lengths of stay for non-Medicare patients. No estimates were provided of nursing savings and greater margins on private patients, but they must have been considerable. When cheaper generic drugs were substituted for brand names, all payers benefited, not just Medicare demonstration patients.

When ionic contrast media were substituted for nonionics in performing angiograms, all patients undergoing catheterization benefitted from lower cost. The same is true with shorter ICU stays and same-day surgery admissions. Indeed, one hospital's managed care director believed that "many payers [in the city] were the primary beneficiaries of the demonstration in that they were able to negotiate total bypass packages on private patients, following the demonstration's lead, that saved $20,000 per case."

Once again, management in a fourth hospital was disappointed in the cost savings they achieved, although most felt significant changes in internal organization had taken place in the last year. Admittedly, when they began the demonstration, no financial goals were stated, implying that cost reductions either were not expected or not viewed as key to success. In fact, this hospital's strategy relied at first on increasing volumes and driving down average fixed costs. It was only when volume growth did not materialize that the hospital belatedly turned to internal cost management to avoid severe financial losses.

Cost containment was not a particular issue in St. Vincent's, either, given the long-standing pressures of private and Medicare at-risk managed care already in the Portland area. The hospital experienced a small, continuing decline in bypass costs and lengths of stay that already were the lowest in the demonstration. Length of stay was constant in 1994. Certain in-house management changes were successful such as getting the cardiologists and pulmonary staff involved and concerned over excessive testing.

14.8 Physician-Hospital Alliances

Practically, all hospitals entering the demonstration wanted to forge a closer relationship with their medical staffs. In most cases, this was true of surgeons as well. Even to apply to be a demonstration hospital required many difficult meetings over issues of bidding strategies, how the payment would be split, which specialists would be under the demonstration, etc. Hospital managers uniformly agreed that the advent of private managed care required that their medical staffs take a more active interest in hospital costs. Physicians, for their part, sought more marketing support for their own practices.

All hospitals felt that closer hospital-physician alliances were an important achievement of the demonstration, although tensions still exist in several facilities. Most hospital managers agreed that the demonstration was the first time that they had sat down with their physicians with "fixed dollars on the table." While contentious at times, most felt it better for providers to decide how to split up the payment than by having the government—or managed care bureaucrats—divide up the payment.

Another by-product of working together was the "education of the physician, who under the demonstration was seeing, often for the first time, how all the costs and services fit together." As overall manager of the patient's care, hospital managers, in particular, felt that forcing surgeons and cardiologists to vertically integrate the many services patients received can only enhance cost effective medicine. Physicians and hospital managers have worked together in the demonstration like never before, exchanging cost and clinical information, developing marketing plans, building referral networks, re-evaluating the use

of drugs and supplies, negotiating private global bundled payment arrangements, etc. Working together under identical financial incentives is perceived by all as key to building the alliance. It also has been challenging, particularly in changing practice patterns. Physicians are used to treating the hospital as their workshops with no financial responsibilities for nurses, operating room supplies and downtime, ICU telemonitoring, expensive brand name drugs, and the like. They have had to make many changes. In only one or two hospitals has the relationship between surgeons and the hospital been adversarial at times. Yet, even in these instances, changes have taken place. Managers and physicians have worked together on new clinical protocols, marketing efforts, and managed care negotiations.

As expected, the relationship between the hospital and consulting physicians deteriorated somewhat, although this varied depending upon the frequency of consulting visits before the demonstration began. Pulmonologists, radiologists, nephrologists, neurologists, and cardiologists in one hospital were very upset when surgeons began reducing consultations and managing patients post-operatively on their own. Claims of undertreatment and poorer quality were made in meetings with the hospital CEO. Management asked physician consultants to verify their claims through quantitative studies. No such studies had been submitted at the time of our interviews, and the tensions have subsided as consultants accustomed themselves to lower referral rates.

Among the additional sites, St. Vincent's in Portland was far less concerned about coordinating hospital and physician incentives. Physicians were quite used to the concept

of managed care bidding and already had considerable experience developing bids. What also encouraged physicians to participate was a list of surgeon incomes for other hospital participants supplied by L. Byrne, Associates. Participation was a way in which the hospital, through its demonstration waivers, could legally share cost savings with its physicians. Besides, the hospital was the only one offering to discount; the physicians did not discount. Even still, surgeons were disappointed that the demonstration did not allow them to market aggressively in outlying communities using a (Centers of Excellence) imprimatur. And, of course, the hospital was reticent to advertise in Portland for fear of taking patients away from it sister hospital. Hospital management believed that the surgeons would probably want to bid again under the new Medicare Participating Centers for Excellence demonstration, but the arrangement was too one-sided with no gain for the institution because, again it didn't want to compete against its sister hospital. Another reason for the hospital's reticence to extend the bundled concept to private plans was the lack of a coordinated hospital-physician data and billing system. Besides, the hospital preferred physicians to negotiate their own fees with plans rather than put the onus on the hospital.

Managers at Methodist Hospital in Indianapolis felt the demonstration was a great, albeit expensive, learning experience. It forced discussions between hospital managers and physicians that actually went much smoother than expected. With the growth in managed care, locally, physicians are seeing the spillover effects of the demonstration and are now active supporters.

Hospital managers at St. Luke's felt they always had good relations with their physicians and, if anything, improved them during the demonstration through the alignment of incentives. Prior to the demonstration, physicians didn't hesitate to order a helicopter to bring a patient in and would intervene in hopeless cases regardless of the cost. Attempts to educate physicians on the economics of DRG payment and the financial implications of their practice patterns were frustrating. Now, physicians are practicing more cost-effective medicine. Several even travelled to St. Joseph's in Atlanta to learn new practice modes, and others visit other hospitals yearly to learn new cost-saving methods. As a result, St. Luke's enjoyed significant cost savings as early as the first year of participation. Demonstrable reductions in costs by aligning incentives seems somewhat contradictory to the site's claim that it was already low cost and operating efficiently. One or two other sites had a similar experience, as evidenced by the statement: "Yes, we already are low cost; yes, we were able to reduce or costs even more." Based on the experience at St. Luke's and elsewhere, alignment of surgeon and hospital financial incentives has drawn surgeons and hospital managers closer while creating a split between the surgeons and a few other complementary physician specialties.

14.9 Quality Improvements

No hospital entered the demonstration with even an unstated goal of improving the quality of care for bypass surgery. All candidates were screened by HCFA on their quality before being accepted into the demonstration, and none felt they had any quality problems

to address. Nonetheless, hospital staff in one participating hospital believed that quality had been improved because surgeons were taking a more active interest in complication rates. Complications, more than any other factor, add to costs, possibly up to $1,000 a day for prolonged stays in the ICU. As surgeons focus on sources of complications, they have been able to avoid them, which is a win-win situation: lower costs and better outcomes. It should be noted that many complications to bypass surgery are not life-threatening but can add considerably to costs. By having a financial interest in minimizing the complication rate, regardless of severity, at least one demonstration manager believed that surgeons did not even move to enhance quality.

The hospital in one site tried very hard not to treat demonstration patients any different from other patients. At one time it had put bright yellow stickers on patient charts to identify private managed care patients but ultimately eliminated them for fear of appearing to give unequal care.

14.10 HCFA and Private Supplemental Reimbursement

In addition to the lack of volume gain in most of the sites, reimbursement problems constituted the other major disappointment to participants. This was especially true in the nonacademic institutions. Medicare payment arrangements under the demonstration, when grafted onto the current Fiscal Intermediary and carrier systems, increased payment problems enormously. All sites have had to devote significant resources to the problem and considered it a potentially serious hindrance to the diffusion of the payment method nationwide.

One of several problems mentioned was the delays in getting EOMB forms from HCFA to send to patients and third-party payors. Lags of 6-7 months were encountered versus just a few weeks from the regular FI. Finally, supplemental insurers were sometimes hesitant to pay the hospital for the Part B physician amount for fear of getting duplicative physician bills. Chapter 15 discusses the problems in greater detail. St. Vincent's felt it had little incentive to stay in the demonstration, in part because it was at total risk, not only for outlier patients but for any bad debts and nonpayment of supplemental insurance as well. The hospital essentially sheltered the physicians from any deductible or copay bad debts.

Surgeons at St. Luke's Hospital were still enthusiastic about bundled payment methods in spite of their disappointment over growth in volume. The demonstration served the purpose of bringing the issue of custs to the attention of other hospitals and surgeons. Ideally, the costs incurred at the demonstration sites should become a standard for judging (and challenging) other providers. Hospital staff and physicians also believed the demonstration should be expanded to include valves, orthopedics, arthroscopies, and other types of major and minor surgery.

14.11 Future Participation

Interest varies among the 7 participants in being in the new bundled payment demonstration. The sites in Atlanta and Ann Arbor remain enthusiastic in spite of the limited promotion provided by the government, as does Boston University. Feelings at Ohio State University Hospital are somewhat mixed. The hospital still sees advantages to being a

selected site over its competitors; the academic physicians somewhat less so. Methodist Hospital has been disappointed about both the lack of volume growth and the high costs of administering the program. However, the fact that they have an extremely strong competitor that could be named a Participating Center of Excellence in the new demonstration almost demands that they continue. Finally, St. Luke's-THI and St. Vincent's in Portland see themselves as the dominant provider in their markets. Without a COE imprimatur, there is little to market and scant reason to offer substantial discounts. It is still likely, however, that both would submit sizable bids if other significant local competitors were allowed to apply and a COE imprimatur was the prize.

15 Case Study Findings Regarding Hospital Reimbursement Difficulties

15.1 Introduction

The Medicare Participating Heart Bypass Demonstration required fundamental changes in the way hospitals and physicians were paid; changes due both to the bundled nature of the payment and the fact that it was a demonstration and not a complete restructuring of payment methods for the entire program. The payment arrangements were as follows. Each hospital negotiated a single bundled rate to cover all Part A hospital and Part B physician inpatient care. In order to receive payment, each hospital originally was responsible for bundling all Part B physician bills with the Part A UB92 discharge record and submitting the package to HCFA Central Office in Baltimore for payment. Local Fiscal Intermediaries and Carriers were instructed not to pay any bills submitted under the demonstration, nor were they to receive any. All program payments, excluding any patient obligations, were to come from Central Office. This was done so as to avoid double payment for services: once under the demonstration and a second time by FIs and Carriers.

At first, each hospital was expected to submit a package including all physician bills related to a given stay. Once received, payment was to be processed within 30 days. Because of hospital difficulties in assembling all the Part B bills, HCFA changed policies early on and authorized payment if the three principal bills of the surgeon, anesthesiologist,

and cardiologist were submitted along with the discharge abstract, allowing the remaining Part B bills to be submitted later.

Billing HCFA Central Office for payment was fairly straightforward. Collecting the patient financial obligation from third party supplemental insurers was not. When a bill was submitted to HCFA Central Office, HCFA then determined the extent of the patient's obligation for the Part A and B deductible and the assigned Part B coinsurance amount for that DRG and site. Similar determination is done routinely for individual bills every day at FIs and carriers for all regular Medicare admissions. It requires searching the billing records to see if a patient has already met her deductibles on previous admissions and physician care. Presumably, all DRG 107 patients had met their deductible obligations because they had to be admitted for angiography at another hospital before being referred to the demonstration hospital. DRG 106 patients may or may not have been previously admitted and paid the deductible.

Because HCFA negotiated a flat global payment for every patient receiving a bypass in a demonstration hospital, the Agency felt that every patient should be liable for the same coinsurance on physician services regardless of the amount of care they actually received. Hence, all patients (and their supplemental insurers) were liable for a fixed coinsurance amount (established by HCFA and based in typical Part B payments) plus any extra Part A or B deductible that had not been met.

In simplifying payment by bundling all physician with hospital services into a single global rate, numerous problems were created both in collecting from HCFA and from third

party insurers. First, difficulties arose in identifying patients covered under the rules of the demonstration. Second, delays in identifying patients led to problems where physicians accidentally billed carriers instead of submitting their bills to the hospital. Third, problems developed in receiving payment from HCFA. Fourth, even greater problems were encountered in billing supplemental insurers, including Medicaid. And fifth, significant delays in receiving payment from either HCFA or third parties resulted in severe cash flow problems.

In this chapter, the origins of each of these problems are discussed. Hospitals and HCFA overcame most (but not all) of them, leaving unresolved issues for any similar future the demonstration.

15.2 Organization of Interviews

Because issues surrounding billing and collection were so prominent in the minds of hospital and physician staff, considerable time was devoted to them during the on-site interviews. Besides the manager of the demonstration at each hospital, members of hospital billing and collection departments were interviewed. Occasionally, the CFO or comptroller responded to questions concerning payment delays as well. It was clear that considerable resources had been expended in trying to collect the full payment hospitals were owed. Many staff were frustrated as well that some of the problems concerning third party payment had not been resolved even after five years. A couple of sites supplied copies of forms and lists of names from whom supplemental payment still had not been received.

15.3 Billing Advantages to Global Payment Rates

All hospitals were in agreement that consolidating all hospital and physician services into a single bundled rate was very attractive to patients. Instead of receiving lengthy, itemized, bills describing hospital and physician services, they received a single bill with no confusing list of copays they owed. The psychological advantage to the elderly of streamlining the complicated hodge-podge of bills should not be underestimated. This would be a strong advantage to any future bundled payment demo.

15.4 Problems in Identifying Patients

Medicare patients were deemed eligible for the bundled demonstration payment if they fell into either DRG 106, bypass with angiography or DRG 107, bypass alone. Seemingly straightforward, this clear criterion proved difficult to implement in practice because DRG status could only be determined upon discharge. First of all, to be eligible patients in demonstration hospitals must have had a bypass, but not all patients undergoing bypasses fell in DRG 106 or 107. This is because bypass patients with "other significant surgery" could be grouped into DRG 108. These included procedures like left ventricular resections, patients having an AICD generator inserted, or patients undergoing an endarterectomy on a different artery. Then there were the heart valve patients with bypasses as well that naturally fall in DRG 104 or 105. Hospitals might begin by identifying patients as "eligible" but then find later that they had additional surgery that excluded them.

Further complicating the DRG designation was the fact that the DRG grouper algorithms changed twice during the demonstration. Bypass patients formerly grouped into DRG 108 were reclassified into 106 or 107. Not only did reclassifications confuse DRG coordinators trying to concurrently identify patients so others could manage the internal physician billing process, grouper changes also created biases in the negotiated rates. Most hospitals had submitted bids based on actuarial data on DRG 106 and 107 bypass patients alone. DRG 108 patients, which accounted for 10-20% of bypass patients in some hospitals, were ignored. When HCFA's policy branch made changes in the grouper algorithm, many more expensive patients were now considered eligible for the demonstration. The fixed negotiated rates, however, had not included these higher cost patients. HCFA did adjust hospital payment rates to reflect the change in the grouper algorithms. For an example of the algorithm used in one hospital to identify patients, see Appendix G.

Were only a hospital bill involved, it would have been a relatively simple matter for staff to identify demonstration patients upon discharge and bill HCFA Central Office instead of their Fiscal Intermediary. Problems arose immediately from physicians seeing patients and billing the carrier before the DRG was determined. Physicians, of course, do not take DRG into consideration when billing their carriers for Medicare services. They bill on individual services. Many physician practices bill the carrier the day a service is provided. In the case of DRG 106 patients, this presented particular problems. These patients enter the hospital suffering from chest pain, chronic or unstable angina, or heart attacks. As part of their workup, a physician may initially treat the symptoms with drugs, then recommend a

complete diagnostic work-up, including angiography. This often takes several days. If significant coronary artery stenosis is discovered, the cardiologist and the thoracic surgeon must decide whether angioplasty or bypass is the appropriate procedure for a given case, if continued drug therapy is ruled out. If a bypass is agreed upon, the patient is scheduled for surgery and undergoes the operation. Only at that point is it definite that the patient has become eligible for the demonstration, although other complex surgery may put the patient in a different DRG. Further complicating identification are patients who undergo unsuccessful angioplasty and move on to bypass surgery. Thus, for a host of different reasons, from the day of admission to the day of surgery, physicians may have been seeing and billing the carrier for services rendered to demonstration patients.

Hospitals had many problems at first with premature billing. In fact, physicians in one hospital still accidentally bill their carrier, and the hospital has to refund any payments once it is paid the global payment from HCFA Central Office. Staff in all institutions have established procedures for early identification of potential demonstration patients. In one instance, physician personnel identify them in their office prior to admission. For DRG 106 patients already admitted, clinical nurse specialists hired to monitor bypass patients identify patients on the floors every day. In another case, a hospital has developed what it refers to as a "walker grouper" for every DRG 106 coming out of surgery. In a third institution, utilization review staff provide a log of inpatients twice weekly to the nurse specialists to identify patients.

It appears that the two academic medical centers have fewer problems with premature physician billing due to the small number of separate practices and their inclination to wait until the patient is discharged before billing. By contrast, St. Joseph's in Atlanta has 139 separate practices to keep track of and avoid unwarranted billings to carriers. They notified the carrier not to pay physician bills until approved by the hospital to avoid having to make refunds later on.

15.5 Collecting Physician Bills

Unavoidable delays in determining patient eligibility for the demonstration have created significant problems in premature physician billings. It took most participants nearly a year to develop a comprehensive way of identifying patients and notifying and gaining cooperation from physician practices not to bill the carrier immediately for someone who might have a bypass. In the case of the four principal specialists, the surgeon, anesthesiologist, cardiologist, and the radiologist, avoiding unwarranted bills being sent to carriers was relatively simple. The problem is mainly with the other specialists who might see a demonstration patient. Once a patient has had a bypass, avoiding consulting bills is easier, but many consultants see patients before they go to surgery; hence, the importance of identifying potential eligibles up front.

No physician diagnosing or treating a demonstration patient is allowed under the demonstration to bill the Medicare carrier. If that happens inadvertently, the physician is expected to repay the carrier for double billing. It was not possible to evaluate how much

double-billing occurred under the demonstration, but the elaborate procedures used by the participants to avoid billing carriers suggests that it was minimal. How physicians were paid by the hospital out of the global fee has been discussed in Chapter 13.

15.6 Problems in Billing and Collecting the Global Fee

Most of the problems in receiving the government's portion of the global fee came early on in assembling the package of Part B bills for submission to HCFA Central Office. At first, HCFA had intended that the package include all physician bills for the inpatient stay, but this quickly proved unduly onerous on hospitals. The requirement was relaxed to require just the three principal bills of the surgeon, the anesthesiologist, and the cardiologist. This requirement was further relaxed by requiring only the surgeon's bill, which comprised half to two-thirds of the total Part B portion of the global payment. (All bills were acquired from the hospital for each case but could be submitted later.)

One hospital said that it collected the surgeon's bill and the related consulting bills within 2-3 days of surgery. Anesthesiologists, however, billed the hospital with a two-week delay, resulting in a 30-day delay after discharge in billing HCFA. They were finding that it took 10-15 days after discharge to assemble a relatively complete package to submit to HCFA. Another hospital also waited 14 working days after discharge to bill HCFA. They would then bill even with only the surgeon's bill. Some variation in the completeness of the package appeared to exist across the four demonstration hospitals, which raises questions about how uniform HCFA's payment policies were.

All hospitals reported that HCFA Central Office paid promptly (with one exception noted below). Hospitals would be wired payment within 20-30 days of the submission of the bill. Thus, from the time of discharge to the receipt of payment, hospitals were receiving payment with roughly a 2-3 week delay compared to other Medicare patients. This was due to the time lag post-discharge in assembling the Part B bills.

Most hospitals developed sophisticated computer software to input all physician bills to produce a summary global package to send to HCFA for payment. Computerization was critical in order to keep track of missing bills, to make refunds to carriers who were billed mistakenly, and to pay physicians for services rendered demonstration patients. Billing and collection staff believed that special dedicated computer systems were burdensome, but necessary, if the hospital and physicians were to continue in the demonstration as well as for bidding on private managed care contracts of a similar type. Having made the investment of time and money in the bill tracking system, staff believed they were at an advantage compared to other hospitals without such systems.

Hospitals did report one significant problem in receiving payment from the Federal government. During the first year of the demonstration, the Congress passed the new Medicare Fee Schedule that resulted in major reductions in many inpatient physician allowable fees, including most importantly, bypass surgery. The revised fees were not implemented immediately but over a four-year transition period. In addition, the Congress also determined how fast allowable fees in general would be increased. This was complicated by the Volume Performance Standards and the differential adjustment for

surgical versus medical care. HCFA's Office of Research and Demonstrations was responsible for incorporating all of these adjustments into the update calculations for global payment price that also included an update based on the prospective payment update factor (one hospital agreed to forego the price update for three years). Delays in completing the update calculations under the demonstration, according to participants, resulted in major cash flow problems in the first quarter of 1994. One hospital said it had received no payments from HCFA in the first 4 months of 1994. In another, they had not received payment on any of the 94 patients they had discharged up to April, 1994. A third hospital reported no payments at least through March 20, 1994, when the interviews were conducted. Eventually, updates were effective retroactive to January 1 of the year, and hospitals received full payment.

According to some hospital staff, requests to continue to receive payment under the old rates were denied by HCFA Central Office. The principal reason was that the Agency had not received many bills in January and February and did not want to get involved in additional adjustments later on.

The four original hospitals averaged roughly 100 demonstration patients per month. If it is true that participants received no payment for four months, then up to approximately 400 patients could be involved. At an average global payment of about $25,000, this amounts to a deficit of $10,000,000. As hospitals continued to pay their physician partners during this time, as well as for their own staff and supplies, the lack of payment presented a definite financial hardship. This experience also highlights a potential problem with

implementing global fees nationwide. HCFA must find ways of dealing with legislative changes in a timely manner, including the simple expedient of paying on old rates until new ones are established.

Besides this major problem, hospital billing/collection staff all felt that HCFA Central Office had been very supportive of their concerns and done just about all that they could to expedite payment. HCFA representatives visited each site and explained procedures and worked out billing arrangements. They relaxed the original requirement that all physician bills be included in the payment package. They wrote cover letters to the carriers and supplemental insurers explaining the unique payment arrangements. They even called carriers to explain procedures and to encourage cooperation. Delays in updating rates were somewhat out of their control as the calculations were dependent on the dates the new PPS and RBRVS rates were published.

15.7 Problems Collecting the Supplemental Insurance

By far the most frustrating aspect of the process was in trying to collect the supplemental insurance owed by third party insurers for the deductible and coinsurance. Included along with payment of the global amount by HCFA Central Office would be the Explanation of Medicare Benefits (EOMB) form (see Appendix H). This form is required by providers in billing either patients or their insurers for any deductible or coinsurance they may owe. HCFA Central Office would withhold the Part A deductible for a few weeks while it determined whether the patient had met their obligation on a prior admission. Because of

the greater difficulties in determining the Part B deductible obligation, HCFA delayed paying the Part B deductible for up to five months, according to staff in one hospital.

The EOMB form under the demonstration differed in material ways from the one insurers were accustomed to receiving in that it combined both Part A and Part B obligations. Under the current Medicare system, hospitals and physicians submit separate bills to Fiscal Intermediaries and Carriers. Part A and B obligations, therefore, are automatically separate (although both EOMB's usually go to the same supplemental insurer for a given patient). More confusing, however, was the absence of any procedure codes, submitted charges, allowed amounts, or any reasons for disallowances that accompany regular EOMBs. Supplemental insurers were being asked to pay a single, uniform, coinsurance on Part B services regardless of the procedures performed, or what amount a number of physicians billed.

As might be expected, nearly all insurers balked at such a novel arrangement. Most said that the billing form lacked detail and, hence, was incompatible with their long-standing computer systems. These systems required that each procedure of each physician be identified separately so that service coverage and reimbursement screens could be applied. Besides, different patients, they said, had different deductible and coinsurance obligations. Other insurers were more indignant, pointing out that "they didn't agree to participate in the demonstration" and weren't going to process the EOMBs.

HCFA demonstration staff made concerted efforts to encourage supplemental insurers to accept the demonstration EOMB form. Appendix I provides a facsimile of the letter

provided to participants explaining the program to insurers. It requests that the insurer not pay the physician directly because they have already been paid under the demonstration. It also emphasizes that the hospital, not the physician, is responsible for collecting the Part B coinsurance amounts, which is novel. While it does mention that no detailed procedure information is supplied, no reason is given for the missing information or how the insurer should input the aggregated amount into their computer system for future reference. Under a section explaining how the aggregate patient/insurer liability was determined by HCFA, it is emphasized that the "one Part B coinsurance amount for each DRG [is] less than what the combined amount would otherwise be for heart bypass surgery performed by these providers outside the demonstration. Thus, the supplemental insurer liability is reduced." Although this was probably true for most patients, some patients may have incurred physician bills that were less than the actuarial amount determined by HCFA, a point insurers were quick to make.

One hospital, and possibly others, responded to insurer objections by sending a package to each insurer that included the EOMB, a letter from the Medicare CABG clerk explaining the unusual EOMB form, the letter drafted by HCFA staff explaining the demonstration, the standard UB-82 form for Part A payment, a letter from the thoracic surgeon, and a complete set of relevant HCFA-1500 Part B physician forms detailing the procedures performed by HCPCS code, the physician's charge, and other relevant information. Over time, as insurers received more of these "global EOMBs", they have made accommodations. Nevertheless, collecting Part B coinsurance amounts have been delayed

several months at least, generating a significant administrative and cash flow burden for all hospitals.

Private supplemental insurers have been a problem that has been addressed at least with some success. Collection from Medicaid, in at least two of the states, has been even more difficult. This is ironic in that it is a public program more than half funded by the HCFA. The Medicaid programs in Michigan and Ohio have refused to pay any supplemental insurance obligations. As part of the OBRA 1990 law, Medicaid has been required to pay for the deductibles and coinsurance of the poor elderly. Michigan and Ohio refused to accept the global packaged rates negotiated by HCFA, arguing that the fixed amount allowed under the demonstration exceeds their own allowable for the procedure. Faced with a novel EOMB form and a single aggregated amount, these states have balked at paying the demonstration hospitals anything to date. The hospital, not the physician, has absorbed the loss.

Billing/collection staff find the whole process very frustrating. If physicians were allowed to bill supplemental insurers directly, they could be paid immediately. HCFA has been unwilling to let physicians bill insurers (or uninsured patients) directly because billings could exceed the actuarial amount of the fixed patient obligation based on the negotiated fee. This is especially the case arise if some patients use more services, or some physicians have especially high allowable fees, or if physicians offered significant discounts to be part of the demonstration yet bill their full allowable fee.

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